TECNOLOGIAS PARA PREVISÃO DA CONDIÇÃO FUNCIONAL DA MÃO APÓS O TRATAMENTO CIRÚRGICO DA DOENÇA (CONTRATURA) DE DUPUYTREN

TECHNOLOGY FOR PROGNOSIS OF THE FUNCTIONAL STATUS OF HAND AFTER SURGICAL TREATMENT OF DUPUYTREN'S DISEASE (CONTRACTURE)

ТЕХНОЛОГИИ ПО ПРОГНОЗИРОВАНИЮ ФУНКЦИОНАЛЬНОГО СОСТОЯНИЯ КИСТИ ПОСЛЕ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ БОЛЕЗНИ (КОНТРАКТУРЫ) ДЮПЮИТРЕНА

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RESUMO

A doença de Dupuytren é um problema agudo e multifacetado que afeta não apenas a medicina, mas também a psicologia e a vida social, uma vez que a pessoa que perdeu a capacidade de desempenhar suas funções socialmente significativas experimenta sofrimento moral e físico. Desde a primeira descrição da doença de Dupuytren até o presente, questões de etiologia, patogênese, classificação, métodos de tratamento e características das medidas preventivas desta doença permanecem discutíveis. Portanto, o principal objetivo do trabalho foi analisar a tecnologia para prever o estado funcional da mão após o tratamento cirúrgico da doença (contratura) de Dupuytren. O estudo foi realizado no Departamento de Microcirurgia da Mão do Hospital Clínico Republicano do Ministério da Saúde da República do Tataristão. O número total de pacientes sob observação foi de 258, com idades entre 21 e 80 anos. Os resultados da pesquisa foram agrupados em 6 combinações. Foi determinado que três grupos de fatores afetam o grau de cura: A (sexo, idade, objetivo da doença, período de exame, nível de gravidade); B (local de residência, trabalho físico e mental, maus hábitos); C (experiência do cirurgião, tipos de operações, anestesia, seção, plasticidade da pele, tratamento reconstrutivo, cicatrização, etc.). Verificou-se que é possível obter a restauração completa da função da mão direita em 67,5% e da mão esquerda em 59,9% em períodos superiores a um ano.

Palavras-chave: *contratura de Dupuytren, tecnologia de prognóstico, estado funcional da mão, prognóstico, cirurgia.*

ABSTRACT

Dupuytren's disease is an acute and multifaceted problem that affects not only medicine but also psychology, social life, since a person who has lost the ability to perform his/her socially significant functions experiences moral and physical suffering. From the first description of Dupuytren's disease to the present, questions of etiology, pathogenesis, classification, treatment methods, and features of the preventive measures of this disease remain debatable. Therefore, the main goal of the paper was to analyze the technology for predicting the functional state of the hand after surgical treatment of Dupuytren's disease (contracture). The study was conducted at the Department of Hand Microsurgery of the Republican Clinical Hospital of the Ministry of Health of the Republic of Tatarstan. The total number of patients under observation was 258, age 21-80

years. The research results were grouped into 6 combinations. It has been determined that three groups of factors affect the recovery degree: A (gender, age, examination period, severity); B (place of residence, physical and mental work, bad habits); C (surgeon's experience, types of operations, anaesthesia, section, skin plastic, reconstructive treatment, healing, etc.). It has been found that it is possible to achieve full restoration of the function of the wrist on the right hand in 67.5% of patients and on the left hand in 59.9% of patients in periods of more than one year.

Keywords: *Dupuytren's contracture, prognosis technology, functional status of hand, prognosis, surgery.*

АННОТАЦИЯ

Болезнь Дюпюитрена является острой и многогранной проблемой, затрагивающую не только медицину, а также психологию, социальную жизнь, поскольку человек, потерявший возможность выполнять свои социально значимые функции, испытывает моральные и физические страдания. С первого описания болезни Дюпюитрена и до сегодняшнего времени дискуссионными остаются вопросы этиологии, патогенеза, классификации, методов лечения, особенностей проведения профилактических мероприятий данного заболевания. Поэтому основная цель работы заключается в анализе технологии по прогнозированию функционального состояния кисти после хирургического лечения болезни (контрактуры) Дюпюитрена. Исследование было проведено в отделении микрохирургии руки Республиканской клинической больницы Министерства здравоохранения Республики Татарстан. Общее количество пациентов, над которыми происходило наблюдение, составило 258, возраст 21-80 лет. Результаты исследований были сгруппированы в 6 комбинаций. Определено, что на степень излечения влияют три группы факторов: А (пол, возраст, назначение болезни, период обследования, степень тяжести); В (место жительства, физическая и умственная работа, вредные привычки); С (опыт хирурга, виды операций, анестезия, сечение, кожная пластика, восстановительное лечение, заживление и др.). Установлено, что возможно достичь полного восстановления функции кисти на правой руке у 67,5%, на левой руке – у 59,9% в периоды более одного года.

Ключевые слова: *контрактура Дюпюитрена, технология прогноза, функциональное состояние кисти, прогноз, хирургия.*

1. INTRODUCTION

Dupuytren's disease (Dupuytren's contracture – DC) is chronic, progressing cicatricial degeneration of palmar aponeurosis, accompanied by flexion contracture of fingers of hand. Dupuytren's contracture is a progressive fibrous proliferation of the palmar fascia of the hand. It is a tumor (growth) but not a cancer. There is no known cause or etiology for Dupuytren's. It is considered an inherited condition (Gonzalez and Gonzalez, 1990; Becker *et al.*, 2015; Ten Dam *et al.*, 2016) and not related to the type of job or hand use. The disease is metabolic and genetic in nature. Surgical treatment for today is the most radical and effective though radiotherapy with soft X-rays (Zirbs *et al.*, 2014) and collagenase injections (Muppavarapu *et al.*, 2015; Verheyden, 2015) are applied.

However the question on indications to operative treatment is not solved definitively; search of the optimal surgical access considering anatomic-physiological singularities of skin of palmar surface of hand providing good vision and freedom of manipulations proceeds; the question on volume of excision of palmar aponeurosis in

relation with possibility of recurring and the further advance of pathological process is not solved. Methods of operations and guiding of the postoperative period at patients need classification and specification (Crean *et al.*, 2011). The extent of excision of palmar aponeurosis increases among need fasciotomy (Badois *et al.*, 1993; Lermusiaux *et al.*, 1997), subcutaneous fasciotomy (Kelly and Clifford, 1959; Luck, 1959), segmental fasciectomy (Moermans, 1991; Moermans, 1996), limited fasciectomy (Lubahn *et al.*, 1984; Chick and Lister, 1991; McCash, 1964; Maravic and Landais, 2005), dermo-fasciectomy (Hueston, 1963), total (radical) fasciectomy (McIndoe and Beare, 1958).

The resulting effect of DC treatment is influenced not only by the operation's choice but by series of factors: grade of expression of contracture, prescription of disease, heredity, social premises, age, type of job of the patient. The complications of surgical treatment of DC originating in the long-term postoperative period (LPP) are classified as 1. Disease relapse; 2. Disease extension 3. Disease advance (origin or augmentation of pathological process on not operated hand) (Mikusev *et al.*, 2007) which does

not refer to the group of postoperative complications as can originate without the fact of operation, however, if it happens after operation, it is reasonable to consider it for two reasons: 1. Recovery is important for the patient, that is the total absence of signs of disease, 2. The adequate understanding of the correct approach on a method, a range and tactics of operative treatment at palmar fibromatosis should be based on that fact that the palmar fibromatosis is benign fibroproliferative tumor, with genetic background (Ten Dam, E.P. *et al.*, 2016; Becker *et al.*, 2015) according to ICD – 10 – a fascial fibromatosis of unknown etiology (M-720) (International Statistical Classification..., 2010), and relapse, extension and advance are clinical implication of dynamics of tumor growth.

All three types of long-term outcomes lead to disturbance of hand's function, affect results of treatment and are the indication for repeated operation. In turn, the outcome prognosis of the functional status of hand (FSH) after operation is the important element of postoperative follow-up of the patient and preventive maintenance of deterioration in its status. Evidently that the long experience of DC treatment gained by specialists needs the quantitative analysis which has already allowed to tap some trends in recovery of FSH at operative DC treatment, in particular, short – and long-term efficiency of surgical treatment (Crean *et al.*, 2011). Thus each group of researchers analyses types of operations traditional for their clinics. The extension of the detailed analysis of operative DC treatment by the techniques used in our clinic will allow to perform the further optimization of volume and technique of operations at DC. The research goal is to develop a technology of prognosis of the functional status of hand after surgical DC treatment, depending on 1. Factors of biology of the patient, 2. Lifestyle of the patient, 3. Technical–surgical components of operation and rehabilitation treatment.

Research was approved by committee on ethics of State Budget Educational Institution of High Professional Education “Kazan State Medical University” of Health Ministry of Russia; the protocol of meeting No.8 from October, 28th, 2014. Necessary HIPAA consent was obtained from each patient.

2. MATERIALS AND METHODS

Research was led on the basis of the Tatarstan Republic medical institution (Russian Federation), in Kazan – in hand microsurgery unit of Scientific Practical Traumatology Centre of the

State Autonomic Healthcare Institution «Republican Clinical Hospital of Health Ministry of Tatarstan Republic». The total quantity of operated patients with DC has constituted 258 patients at the age of 21-80 years. The total quantity of the operated hands was 343: 191 operations (55.7 %) on the right hands, 152 (44.3 %) operations on the left hands. Exclusion criteria for both groups were: age <18 years, pregnant women, and arthroplasty or arthrodesis of the treated joint and stretching, and fat grafting (McInerney and Clover, 2015).

Dupuytren's disease (contracture) was parted on three grades and classified according to the grade of contracture of fingers of hand (Bejul, 1926) (Mikusev, 2001): I grade – induration of palmar aponeurosis without flexion contracture in joints of fingers; II grade – induration of palmar aponeurosis with flexion contracture in MTP joint to an angle 100°; III grade – induration of palmar aponeurosis with flexion contracture in MTP joint to an angle <100° and flexion contracture in proximal inter phalanx joint. In chapter “results” are presented both a grade of classification according to A.P. Bejul, and contracture angle in grades (Table 8) for the purpose of comparison to other classifications (Luck, 1959; Henry and Meyerding, 1936; Iselin and Iselin, 1967; Tubiana and Michon, 1961). DC localization (DC grade is the affected finger of hand/quantity of patients with lesion of the given finger/proportion in %): the right hand, I grade – 1/17/6, 6; 2/15/5, 8; 3/47/18, 2; 4/20/7, 8; 5/32/12, 4 ($p < 0, 001$). II grade – 1/6/2, 3; 2/5/1, 9; 3/40/15, 5; 4/81/31, 4; 5/21/8, 1 ($p > 0, 98$). III grade – 1/2/0, 8; 2/2/0, 8; 3/8/3, 1; 4/40/15, 5; 5/23/8, 9 ($p > 0, 98$). The left hand, I grade – 1/45/17, 5; 2/17/6, 6; 3/48/18, 6; 4/45/17, 5; 5/30/11, 6 ($p < 0, 001$). II grade – 1/5/1, 9; 2/8/3, 1; 3/33/12, 8; 4/60/23, 3; 5/35/13, 6 ($p > 0, 98$). III grade – 1/2/0, 8; 2/3/1, 2; 3/11/4, 3; 4/39/15, 1; 5/60/23, 3 ($p > 0, 98$).

Excised part of PA. A – the partial excision of changed bands, stretched to one finger – 1; to two fingers – 1+2; to three fingers – 1+2+3; to four fingers – 1+2+3+4; B – excision of proximal part – 1; C – excision of proximal and middle parts – 1+2; D – total excision – 1+2+3. E – sphenoidal excision of middle part of PA and longitudinal bands of distal department of PA with conservation of cross fibers at level of distal third of the metacarpal bones, stretched to four fingers – 1+2+3+4 (Ea); to three fingers – 1+2+3 (Eb); to two fingers – 1+2 (Ec); to one finger – 1 (Ed); $\alpha = 20^\circ - 30^\circ$. The following types of operations on palmar aponeurosis have been made to the patients (Figure 1, Table 1): A – limited (partial)

fasciectomy (Brenner, 1997; Hueston, 1961) (Figure 1 – A), B – limited (partial) excision of proximal part of PA (Figure 1 – B), (Dabrowski, 1967), C – limited (partial) excision of proximal and middle parts of PA (Figure 1 – C) (Mikusev, 2001), D – total (radical) fasciectomy (McIndoe and Beare, 1958) (Figure 1 – D), E – limited (partial) sphenoidal excision of middle part of PA and longitudinal bands of distal department of PA with conservation of cross fibres at level of a distal third of metacarpal bones (Figure 1 – E) (Mikusev, 2001). Sphenoidal excision of middle part of PA is made in a cross direction with deviation from a perpendicular on an angle $\alpha = 20^\circ - 30^\circ$; excision of PA is stretched to four (Ea), to three (Eb), to two (Ec) or to one (Ed) finger independence from scale of operation.

Status localis after surgical treatment was estimated on periods 1 year and more after operation. The following points were considered as LPC: 1. Relapse 2. Extension 3. Advance. The functional status of hand (FSH) after operation was estimated according to the original scale (table 2) (Magomedov *et al.*, 2013) where FSH and the patient's cure were estimated. The cure was appreciated as complete recovery of hand function (i.e. the patient considers itself healthy; postoperative cicatrix is hardly noticeable, elastic, soft; sensitivity on hand and fingers is normal; flexion contractures are not present; hand function is recovered) and absence of LPC (relapse, extension, advance) on both hands (Table 2).

The authors did not use famous questionnaires on estimation of extremities' state after operation as Canadian Occupational Performance Measure (COPM) in relation to the Disabilities of Arm, Shoulder, and Hand (DASH) questionnaire and the Michigan Handout comes Questionnaire (MHQ), as they are not absolutely adequate at lesions of hand (van de Ven-Stevens *et al.*, 2015). We have analyzed 222 factors and their combinations registered at follow-up of patients with DC at developing of system of the functional hand status prognosis. We have divided them into three groups (Appendix, Supplement 1): A (118 factors) – the factors determining the biological status of the patient (gender, age, prescription of disease, examination period, grade of DC lesion, heredity, the associated diseases, surgical history and traumas, the disease beginning, laboratory analyses, etc.); B (20 factors) – the factors presenting lifestyle of the patient (residence, physical and mental job, bad habits, etc.); C (84 factors) – the factors presenting technical-

surgical components of operations and rehabilitation treatment (the experience of the surgeon, types of operations, anesthesia, section, dermal plasty, rehabilitation treatment, healing, etc.). Statistical analysis has been made with the application of software package SPSS (v.13.0). Discriminate function analysis has been used for developing of prognosis system of surgical treatment efficiency. Criterion χ^2 and accuracy of classification was applied for the analysis of qualitative indices.

3. RESULTS AND DISCUSSION:

The detailed analysis of cure from DC was conducted according to following factors of clinical-statistical characteristics of patients with DC and its combination: type of operation, the technique of surgical manipulations, in dice's coefficient (number of patients/cure, %) – it should be appreciated that the combination of type and technique of operations leads up the number of clinical alternatives to 35. The results in our researches have been grouped in 6 combinations. Groups have been generated by the following principle (Table 3): 1 right (No. 2, 5) or left (No. 3, 6) operated hands; 2. Both (No. 1, 4) operated hands; 3. one (No. 1, 2, 3) or various types (No. 4, 5, 6) of operations.

85 patients were operated on both hands, 173 patients were operated only on one, right or left hand. Groups (at the analysis of section type) have been generated by following principle (Table 4): 1. right (No. 2, 5) or left (No. 3, 6) operated hands; 2. Both (No. 1, 4) operated hands; 3. operated by one (No. 1, 2, 3) or various sections' types (No. 4, 5, 6).

Recovery of hand function was determined as: excellent, good, fair, bad (Table 5).

Result (at developing of FSH prognosis technology) was estimated as excellent even with LPC as recovery of movements' function of fingers of hand was the most important fact for the patient was. We used 2 approaches:

I. We prognosticated an outcome, according to scale of FSH estimation: excellent/good/fair/bad (Table 6), considered the effect of combination of factors of groups A + B + C: 1. right, left or both hands are operated 2. right hand is operated 3. left hand is operated. (Table 6, No. 1-3); factors of groups A + B: 4. right, left or both hands are operated; 5. right hand is operated; 6. left hand is operated. (Table 6, No. 4-6); factors of group C: 7. operation type; 8.

Operated right, left or both hands are operated; 9. right hand is operated; 10. Left hand is operated (Table 6, No. 7-10);

II. Prognosticated outcome: complete functions recovery (Table 7), result estimation: excellent (yes/ no). Impact of factors' combination of groups: A + B + C (Table 7, No. 1-3); factors of groups A + B (Table 7, No. 4-6); factors of group C (Table 7, No. 7-10).

The clinical example on prognosis of long-term postoperative complications after interventions concerning Dupuytren's disease (contracture) based on the analysis of factors A + B + C (right, left or both hands are operated) is presented according to the equation No.1 Table 7. (Appendix, Supplement 2).

Absence of LPC at the patient in the postoperative period reflects the fact that the biological substance of tumor has been eliminated in maximum. The minimum injury of the anatomy of the biomechanics and apparatus which is tightly related to palmar aponeurosis (Figure 2 (Netter, 2003), Figure 3 (Moermans, 1997)) is essential at choice and making operation from the point of view of conservation or recovery of FSH.

The basic question at estimation of DC treatment touches periods of observation after operation. Traditionally, the observation periods at the effectiveness' analysis of treatment are parted: < 6 months – short-term, > 6 months – long-term observations (Crean *et al.*, 2011). Periods of treatment and follow-up after operation concerning DC before working capacity recovery constitute 45-82 days. However, we think that period of the beginning of the analysis from 6 months is not reasonable, as process of healing and recovery of hand function after operation can constitute more than 6 months, especially at intra-operative complications: neuropraxia, nerve injury, arterial injury, flexor ten-don injury, or early postoperative complications: hematoma, infection, skin; therefore observation period ≥ 1 year is justified.

The criterion of efficiency is not today the general notion. The state estimation is used:

1. Finger (Smith and Breed, 1994; Foucher *et al.*, 1995; Tripoli and Merle, 2008),
2. Hands (Smith and Breed, 1994; Foucher *et al.*, 1995),
3. Joint (Macnicol, 1984; Foucher *et al.*, 1992a; Kjeldal and Nygaard, 1998; Coert *et al.*, 2006),

4. Arm (Makela *et al.*, 1991; Moermans, 1996; Constantinou and Deutinger, 1996; Foucher *et al.*, 2003). Additional complication to the classification of treatment's results is the application of several classifications according to DC grades that complicates classification of results' estimation. Separation of DC into three grades (Luck, 1959), four grades (Iselin and Iselin, 1967) is used. DC classification in five grades (Henry and Meyerding, 1936; Tubiana and Michon, 1961) is applied in the majority of clinics. In the postoperative period, in period ≥ 1 year, DC is characterized by disturbance of hand function (the long-term results) in several cases.

Cure, depending on operation type, > 50 % was attained in cases No. 2, 5, 6 (Table 3). Minimum cure was in groups No. 1, 4 in operation «E» (group No.1) or in combination with other operations (group No.4) on both hands. Low cure from DC at operations in both hands reflects not so much negative impact of operation of type «E» as scale of Dupuytren's injury of the patient's organism. Cure, depending on section type on palm > 50 % was attained in cases No.2, 6 (Table 4). Minimum cure was in groups No. 1, 4 (Table 4). A low cure from DC at operations on both hands also reflects the scale of Dupuytren's injury of the patient's organism. The obtained data shows that cumulative surgical DC treatment by various types of operations (the partial excision of changed bands, excision of proximal part, excision of proximal and middle part, total excision, sphenoidal excision of PA) allows to provide free status of the patient – absence of disturbances of hand function in periods ≥ 1 year on the right hand in 67, 5 % of cases, on the left hand – in 59, 9 % of cases. The proportion of the bad results did not exceed 4, 6 % (Table 5).

The estimation of outcomes of DC treatment of the patients by various groups of specialists, by means of descriptive statistics of finger (Foucher *et al.*, 1995; Smith and Breed, 1994; Tripoli and Merle, 2008), hand (Smith and Breed, 1994; Foucher *et al.*, 1995), joint (Macnicol, 1984; Foucher *et al.*, 1992a; Foucher *et al.*, 1992b; Kjeldal *et al.*, 1998; Coert *et al.*, 2006), arm (Makela *et al.*, 1991; Moermans, 1996; Constantinou and Deutinger, 1996; Foucher *et al.*, 2003) and the one-parameter analysis (Nieminen and Lehto, 1986; Norotte *et al.*, 1988; Bulstrode *et al.*, 2005;) does not allow to gain the analysis of results, i.e. prognosis of outcome for the individual patient. Adequate mathematical analysis has allowed to develop a system on result prognosis– the functional hand status in the postoperative period at the patient

with Dupuytren's disease (contracture). It is presented in the form of a combination of the equations (Table 6, Table 7). From 3 (the equation No. 8) to 9 (the equation No. 3) parameters became essential for FSH prognosis (excellent/good/fair/bad) (Table 6) from 222 parameters of the anamnesis and follow-up of the patient, depending on operation type. The equations on FSH prognosis (excellent / good/ fair / bad) are characterized by accuracy of classification of 53, 3-66, 0 % (Table 6). The impact of factors of group "C" at operations is not approximated in the form of the equation: the right hand (the equation No. 9) is operated; the left hand (the equation No.10) (Table 6) is operated. Their number includes equation No.7 (Table 6) where accuracy of classification has constituted only 30, 6 % as the mathematical model should present not less than 50 % of patients according to the common rule.

In the paper to explore factors that were most related to functional recovery as measured by DASH in patients with Dupuytren's disease, the three variables "need to take special precautions", "avoid using the hand in social context", and health-related quality of life (EQ-5D index) explained 62,1 % of the variance in DASH, where the first variable had the greatest relative effect (Engstrand *et al.*, 2015), i.e. the IR number is restricted and has no analytical representation in the form of the equation. From 1 (the equation No. 7; No.10) to 13 (the equation No. 2) parameters have appeared essential from 222 parameters of the anamnesis and follow-up of the patient, depending on operation type in our research for FSH prognosis (excellent: yes/ no) (Table 7). The equations for FSH prognosis (excellent: yes/no) are characterized by accuracy of classification of 57, 4-77, 0 % (Table 7). Accuracy of factor of group "C" as «the right hand is operated» is not approximated in the form of the equation (the equation No. 9) (Table 7).

The gained results have solved a series of tasks:

1. The factors hindering (21 factors: A factors – 11; B factors – 1; C factors – 9) and favoring (9 factors: A factors – 5; B factors – 3; C factors – 1) to FSH recovery (Table 8).

2. Possibility to prognosticate result of operative DC treatment of hand in terms of its functional status (excellent/good/fair/bad), depending on DC localization, type of operation, technique of section, etc.

3. The resource of the surgeon in FSH improving is restricted by choice of technique of

operative measure and by algorithm of postoperative follow-up at the stage of surgical DC treatment. The research has framed the possibility to adjust the result of treatment on preoperative stage is operatively – technical and rehabilitation parts of the patient's follow-up (Table 8):

A. Negative factors: at operative DC treatment on the right hand: by surgeon with the general surgical experience more than 30 years (C_{13}); application of curly section on fingers (C_{28}), sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA (C_6), application in the postoperative period of rehabilitation treatment (dia dynamic currents, variable electric field of ultrahigh frequency, ultra-violet irradiation) (C_{35}); at operative DC treatment on the left hand: by surgeon with general surgical experience 16 – 20 years (C_{51}); application of curly section on palm (C_{66}), the partial excision of palmar aponeurosis (C_{42}), healing by second intention (C_{80}); combination of the partial excision of palmar aponeurosis on one hand and sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA on other hand, made in various periods (C_{83}). B. Positive factors: at operation on the left hand: the free dermal plasty on 4 finger (C_{73}).

4. CONCLUSIONS:

The detailed analysis of cure from DC was conducted according to following factors of clinical-statistical characteristics of patients with DC and its combination: type of operation, the technique of surgical manipulations, in dice's coefficient (number of patients/cure, %) – it should be appreciated that the combination of type and technique of operations leads up the number of clinical alternatives to 35.

1. The effectiveness analysis of alternatives of surgical treatment allows to state that it is possible to achieve complete recovery of hand function on the right hand in 67,5 %, on the left hand – in 59,9 % in periods more than one year.

2. Factors of groups A, B, C influencing recovery of the functional status of hand are determined.

3. Informative ness of prognosis technology of the functional status of hand (excellent / good/ fair / bad) on the basis of factors A, B, C of patients constitutes: A+B+C: 61,6 – 65,4 % ($p=0,0001$); A+B: 59,9 – 66,0 % ($p=0,0001$); C: 53,3 % ($p=0,0001$).

4. Informativeness of prognosis technology of the functional status of hand (excellent: yes/ no) on the basis of factors A, B, C of patients constitutes: A+B+C: 65, 8 – 77, 0 % (p=0, 0001); A+B: 58,1– 69,0 % (p=0, 0001); C: 57,4 – 61,8% (p = 0,028 – 0,033).

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Table 1. Allocation of patients by types of the operations

Operation type	Hand (proportion of operations)	
	The right hand (%)	The left hand (%)
A	The partial excision of the changed bands of PA – 3 (1, 6)	The partial excision of the changed bands of PA – 3 (2, 0)
B	Excision of proximal part of PA – 2 (1, 0)	Excision of proximal part of PA – 5 (3, 3)
C	Excision of proximal and middle parts of PA – 21 (11, 0)	Excision of proximal and middle parts of PA – 17 (11, 2)
D	Total excision of PA – 3 (1, 6)	Total excision of PA – 7 (4, 6)
E	Sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA – 162 (84, 8)	Sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA – 120 (78, 9)
	$\Sigma = 191 (55.7)$	$\Sigma = 152 (44.3)$

Table 2. Grade scale of cure from DC and the functional status of hand after operation at patients with DC on periods ≥ 1 year (Magomedov et al., 2013)

Estimation Parameter, No	Sign	Scale			
		4	3	2	1
1. Cure of the patient	1. Opinion of the patient on treatment outcome	No complain regarding the hand's function	Satisfied	Not completely satisfied	Not satisfied
	2. Postoperative cicatrix	Negligible-elastic, soft	Just noticeable, Slightly astringent, slightly indurated	Noticeable, astringent, indurated	Explicitly noticeable – strongly astringent, rough
	3. Sensitivity	Normal	Sensitivity is lowered	Sensitivity – is sharp lowered	Sensitivity – is completely lacking on two-three fingers
	4. A flexion contracture-*	not present	In proximal – an interphalanx joint $> 160^\circ$	In proximal interphalanx joint $\leq 160^\circ$	Does not differ from preoperative situation or is expressed in a greater extent
	5. Hand's function	recovered	good	improved	restricted
	6. LPC	not present	present	present	present

The note: Estimation of recovery of function of hand after operation (1 – 5 points): 20 points – excellent, 15 points – good, 10 points – fair, 5 points – bad, Cure from DC (1 – 6 points): 24 cure; <24 – cure is absent. * – 1800, the fingers can be completely unbent in all joints. Position of the bent phalanx at an angle 1600 is admissible

Table 3. Cure of patients from DC at operation on one or both hands: recovery of function of hand without LPC, depending on type of the operation

Combination of localization and operation type	Number of patients (258)	Localization and type of operations		Cure from DC on periods ≥ 1 year (number of patients/%)
		The right hand	The left hand	
1	63	E	E	22/34, 9
2	94	E	-*	48/51, 1
3	55	-	E	22/40, 0
4	22	A, B, C, D, E	A, B, C, D, E	5/22, 7
5	12	A, C, D	-	7/58, 3
6	12	-	A, B, C, D	8/66, 7

The note. Type of operations: A – the partial excision of changed bands of PA; B – excision of proximal part of PA; C – excision of proximal and middle parts of PA; D – total excision of PA, E – wedge excision of middle part of PA with longitudinal bands of distal part of PA.

-* – operation only on one hand

Table 4. Cure of patients from DC at operation on one or both hands: recovery of function of hand without LPC depending on section type on palm

No	Number of patients (258)	Section type on palm		Cure from DC on periods ≥ 1 year (number of patients / %)
		The right hand	The left hand	
1	44	I*	I	12/27, 3
2	74	I	-**	40/54, 0
3	49	-	I	20/40, 8
4	41	I, II, III, IV, V	I, II, III, IV, V	9/21, 9
5	32	II, III, IV, V	-	15/46, 9
6	18	-	II, III, IV, V	10/55, 5

The note: -*I – arched (semi-oval), II – “Z”-shaped, III – linear, IV – curly (wavy), V – after Devis.

-** – operation only on one hand.

Table 5. Recovery of function of hand (number of hands / %) of operated DC patients on observation period ≥ 1 year

Recovery of hand's function estimation	Total, number of hands / %	Operation localization	
		The right hand, number of hands/%	The left hand, number of hands/%
	343/100	191/100	152/100
Excellent	220/64,1	129/67,5	91/59,9
Good	88/25,7	47/24,6	41/27,0
Fair	26/7,6	13/6,8	13/8,5
Bad	9/2,6	2/1,1	7/4,6

Table 6. Prognosis of the functional status of hand after DC operation

Medical indice	Factors	No	Combination of operations	Canonical discriminant equation(CDE) (A – the factors determining the biological status of the patient; B – life style of the patient; C– technical-surgical components of operations – treatment)	P	CDE meaning as criterion of prognosis of the functional status of hand in the postoperative period	Accuracy of classification
The functional status of hand in the postoperative period, (excellent, good, fair, bad)	Impact of combination of factors A+B+C	1	operated right, left or both hands	$CDE = -0.554 + 3.102 \cdot A_{65} + 1.279 \cdot A_{10} + 0.498 \cdot A_{52} - 0.466 \cdot A_{12} + 3.631 \cdot C_2 + 3.415 \cdot C_{62} + 3.366 \cdot C_{13} + 2.555 \cdot C_{44}$	0.0001	excellent $< -0.160 \leq$ good $< 0.349 \leq$ bad $< 1.378 \leq$ fair	62.4
		2	operated right hand	$CDE = -0.241 + 5.431 \cdot A_{54} + 3.081 \cdot A_{72} + 2.605 \cdot A_{83} - 1.098 \cdot A_{112} - 2.167 \cdot A_{76} + 2.848 \cdot C_{13}$	0.0001	bad $< -1.316 \leq$ excellent $< -0.137 \leq$ good $< 1.756 \leq$ fair	65.4
		3	operated left hand	$CDE = -0.685 + 6.533 \cdot A_{12} + 2.131 \cdot A_{15} + 1.979 \cdot A_{64} + 0.589 \cdot A_{52} + 0.015 \cdot A_{65} - 3.553 \cdot A_{55} - 3.692 \cdot A_{42} + 6.320 \cdot B_{11} + 6.042 \cdot C_{42}$	0.0001	excellent $< -0.265 \leq$ good $< 0.310 \leq$ fair $< 2.375 \leq$ bad	61.6
		4	operated right, left or both hands	$CDE = -0.547 + 10.387 \cdot A_{12} + 2.126 \cdot A_{10} + 1.443 \cdot A_{52} + 0.495 \cdot A_{65}$	0.0001	excellent $< -0.031 \leq$ good $< 0.264 \leq$ fair $< 1.213 \leq$ bad	61.2
		5	operated right hand	$CDE = -0.130 + 6.388 \cdot A_{76} + 2.346 \cdot A_{112} - 1.848 \cdot A_{83} - 4.793 \cdot A_{54}$	0.0001	bad $< -0.898 \leq$ excellent $< 0.047 \leq$ good $< 2.755 \leq$ fair	66.0
		6	operated left hand	$CDE = -0.732 + 7.517 \cdot A_{12} + 1.824 \cdot A_{15} + 1.537 \cdot A_{64} + 0.805 \cdot A_{52} + 0.077 \cdot A_{65} + 4.897 \cdot B_{11}$	0.0001	excellent $< -0.153 \leq$ good $< 0.219 \leq$ fair $< 1.657 \leq$ bad	59.9

	7	operation type	$CDE = -0.201 + 8.413 \cdot C82 + 7.526 \cdot C83 + 3.904 \cdot C81 + 2.575 \cdot C84$	0, 0001	good $< -0.168 \leq$ excellent $< 0.394 \leq$ bad $< 1.143 \leq$ fair	30.6
	8	operated right, left or both hands	$CDE = -0.077 + 9.145 \cdot C42 + 6.296 \cdot C2 - 0.145 \cdot C68$	0, 0001	good $< -0.129 \leq$ excellent $< 0.366 \leq$ bad $< 0.893 \leq$ fair	53.3
	9	operated right hand	is not approximated	–	–	–
	10	operated left hand	is not approximated	–	–	–

Table 7. Impact of factors of groups A, B, C on the functional status of hand after DC operation

Medical indice	Factors	No	Combination of operations	Canonical Discriminant Equation (CDE) (A – the factors determining the biological status of the patient; B – life style of the patient; C – technical-surgical components of operations – treatment)	P	CDE meaning as criterion of prognosis of functional status of hand after DC operation (excellent: yes/ no)	Accuracy of classification %
The functional status of hand in the postoperative period, ≥ 1 year (excellent, others)	Impact of combination of factors A+B+C	1	operated right, left or both hands	$CDE = -0.776 + 3.122 \cdot A_{67} + 3.035 \cdot C_{13} + 1.535 \cdot A_{10} + 1.325 \cdot A_{52} + 1.135 \cdot C_{80} + 1.075 \cdot C_{51} + 0.499 \cdot A_{95} - 0.812 \cdot A_{71} - 1.565 \cdot C_{73} - 1.814 \cdot B_{10}$	0.0001	Yes < 0.127 No	72.9
		2	operated right hand	$CDE = -2.944 + 2.028 \cdot B_{10} + 1.267 \cdot B_{14} + 1.216 \cdot A_{57} + 1.060 \cdot B_5 + 1.037 \cdot A_{71} + 0.708 \cdot A_{32} + 0.029 \cdot A_{107} - 0.994 \cdot C_{35} - 1.018 \cdot C_6 - 1.065 \cdot A_{25} - 1.541 \cdot A_{85} - 3.070 \cdot B_9 - 3.671 \cdot C_{13}$	0.0001	No < -0.281 Yes	77.0
		3	operated left hand	$CDE = -1.446 + 1.864 \cdot A_{65} + 1.258 \cdot A_{52} + 1.016 \cdot A_{64} + 0.078 \cdot A_{109} - 2.348 \cdot A_{20}$	0.0001	Yes < 0.101 No	65.8

	4	operated right, left or both hands	$CDE = -0.683 + 2.975 \cdot A_{67} + 1.971 \cdot A_{10} + 1.685 \cdot A_{52} + 0.744 \cdot A_{95} - 1.102 \cdot A_{71} - 2.278 \cdot B_{10}$	0.0001	Yes <0.095 <No	69.0
	5	operated right hand	$CDE = 0.181 + 4.215 \cdot B_9 + 2.249 \cdot A_{85} + 1.985 \cdot A_1 - 0.823 \cdot A_{32} - 1.333 \cdot A_{71}$	0.0001	Yes <0.167 <No	58.1
	6	operated left hand	$CDE = -1.415 + 2.492 \cdot A_{39} + 1.854 \cdot A_{65} + 1.067 \cdot A_{52} + 0.940 \cdot A_{64} + 0.076 \cdot A_{109} - 2.209 \cdot A_{20}$	0.0001	Yes <0.105 <No	68.4
	7	operation type	$CDE = -0.109 + 9.375 \cdot C_{83}$	0.028	Yes <0.028 <No	61.2
	8	operated right, left or both hands	$CDE = -1.975 + 2.037 \cdot C_{66} + 1.339 \cdot C_{28}$	0.001	Yes <0.050 <No	57.4
	9	operated right hand	is not approximated			
	10	operated left hand	$CDE = -0.143 + 7.252 \cdot C_{42}$	0.033	Yes <0.036 <No	61.8

Table 8. Impact of factors of groups A, B, C on the functional status of hand after operation

No	The factors hindering to the recovery of function status of hand	No	The factors advancing the recovery of function status of hand
1	A_1 – period of examination of the right hand: 1 – 2 years	1	A_{20} – age: 71 – 80 years
2	A_{10} – period of examination of the left hand: 11 – 15 years	2	A_{32} – diagnosis: the right hand: 4 finger of
3	A_{25} – diagnosis: the right hand: 2 finger of I grade (there is no contracture)		II grade (an angle of contracture from 179° to 100°)
4	A_{39} – diagnosis: the left hand: 1 finger of II grade (an angle of contracture from 179° to 100°)	3	A_{57} – heredity, the brother
5	A_{52} – diagnosis: the left hand: 5 finger of III grade (a contracture angle < 100°)	4	A_{71} – osteochondrosis (associated diseases)
6	A_{64} – Ledderhose disease	5	A_{107} – haemoglobin increase
7	A_{65} – epiarticular finger pulps, the right hand		
8	A_{67} – Peyronie disease		
9	A_{85} – fracture of spinal column (surgical history and traumas)	6	B_5 – physical job: 11 – 20 years
10	A_{95} – prescription of disease, the left hand: 1 – 5 years	7	B_{10} – mental job: 1 – 5 years
11	A_{109} – ESR increase	8	B_{14} – mental job: 31 – 40 years
12	B_9 – physical job more than 50 years	9	C_{73} – on the left hand: the free dermal plasty on 4 finger

13	C6 – on the right hand: sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA
14	C13 – on the right hand: the common experience of the surgeon: more than 30 years
15	C28 – on the right hand: curly section on fingers
16	C35 – on the right hand: rehabilitation (ultrahigh frequency treatment, ultraviolet irradiation)
17	C42 – on the left hand: the partial excision of PA (character of operation)
18	C51 – on the left hand: the common experience of the surgeon: 16-20 years
19	C66 – on the left hand: curly section on palm
20	C80 – on the left hand: healing by secondary intention
21	C83 – combination of the partial excision of palmar aponeurosis on one hand and sphenoidal excision of middle part of PA with longitudinal band of distal department of PA on other hand in different periods

Figure 1. Topographic surgery of palmar aponeurosis (PA) at DC

Figure 2. Normal anatomy of cross section of the lower third of right hand (Netter et al., 2003)

Figure 3. Biomechanic structure of AP (Moermans, 1997). S – skin, lf – longitudinal fibers, tf – cross fibres, slj – Legueu and Juvara septum, t – tendons, dtl – deep transverse ligament, m – metacarpal bone

APPENDIX, SUPPLEMENT 1

Factors of the anamnesis and follow-up of the patient, surveyed at development of efficiency prognosis technology of surgical measures of Dupuytren's disease (contracture):

A -Factors determining the biological status of the patient (gender, age, disease prescription, examination period, grade of DC lesion, heredity, the associated diseases, surgical history and traumas, the disease beginning, laboratory analyses, etc.): Period of examination of the right hand: A1 – 1-2 years, A2 – 3-5 years, A3 – 6-10 years, A4 – 11-15 years, A5 – 16-20 years, A6 – more than 20 years; Period of examination of the left hand: A7 – 1-2 year, A8 – 3-5 years, A9 – 6-10 years, A10 – 11-15 years, A11 – 16-20 years, A12 – more than 20 years; the gender of the patient: A13 – male, A14 – female; Age of the patient: A15 – 20-30 years, A16 – 31-40 years, A17 – 41-50 years, A18 – 51-60 years, A19 – 61-70 years, A20 – 71-80 years, A21 – more 80 years; DC diagnosis on the right hand (affected finger/ DC grade): A22 – 1/I grade, A23 – 1/II grade, A24 – 1/III grade, A25 – 2/I grade, A26 – 2/II grade, A27 – 2/III grade, A28 – 3/I grade, A29 – 3/II grade, A30 – 3/III grade, A31 – 4/I grade, A32 – 4/II grade, A33 – 4/III grade, A34 – 5/I grade, A35 – 5/II grade, A36 – 5/III grade, A37 – atypical form of DC on the right hand; DC diagnosis on the left hand (affected finger/DC grade): A38 – 1/I grade, A39 – 1/II grade, A40 – 1/III grade, A41 – 2/I grade, A42 – 2/II grade, A43 – 2/III grade, A44 – 3/I grade, A45 – 3/II grade, A46 – 3/III grade, A47 – 4/I grade, A48 – 4/II grade, A49 – 4/III grade, A50 – 5/I grade, A51 – 5/II grade, A52 – 5/III grade, A53 – atypical form of DC on the left hand; DC presence in the inheritance at: A54 – mothers, A55 – sister, A56 – father, A57 – brother, A58 – grandmothers, A59 – aunts, A60 – cousin, A61 – grandfathers, A62 – uncles, A63 – cousin; A64 – Lecldehose disease, presence of epiarticular fingers' pulps: A65 – the right hand, A66 – the left hand; A67 – Peyronie disease, Associated diseases: A68 – cardio-vascular system, A69 – respiratory organs, A70 – gastro-intestinal tract, A71 – osteochondrosis, A72 – diabetes, A73 – central nervous system, A74 – pneumatic hammer disease, A75 – oncology, A76 – general diseases, A77 – blade-humerus per arthritis, A78– other; Surgical history and traumas on: A79 –gastro-intestinal tract, A80 – respiratory organs, A81 – the right upper extremities, A82–the left upper extremities, A83 – fracture of ribs, A84 – pelvic fracture, A85 – fracture of spinal column; DC origin in the anamnesis: A86 – acute trauma, A87 – chronic trauma, A88 – spontaneous DC origin; Prescription of origin of disease on the right hand: A89 – 1-5 years, A90 – 6-10 years, A91 – 11-15 years, A92 – 16-20 years, A93 – 21-30 years, A94 – more than 30 years; Prescription of origin of disease on the left hand: A95 – 1-5 years, A96 – 6-10 years, A97 – 11-15 years, A98 – 16-20 years, A99 – 21-30 years, A100 – more than 30 years; Rhesus factor of blood of the patient: A101 – positive, A102 – negative; Blood group of the patient: A103 – O (I), A104 – A (II), A105 – B (III), A106 – AB (IV); Common analysis of blood, meaning: A107 –haemoglobin, A108 – leucocytes, A109 – ESR; Common analysis of urine, meaning: A110 –specific gravity, A111 – response, A112 – transparency, A113 – colour, A114 – fiber, A115 – glucose, A116 – epithelium, A117 – leucocytes, A118 – crystals.

B – the factors presenting life style of the patient (residence, physical and mental job, bad habits, etc.): Place of residence of the patient: B1– city, B2 – village ; physical job during the life: B3 – 1-5 years, B4 – 6-10 years, B5 – 11-20 years, B6 – 21-30 years, B7 – 31-40 years, B8 – 41-50 years, B9 – more than 50 years; mental job during the life: B10 – 1-5 years, B11 – 6-10 years, B12 – 11-20 years, B13 – 21-30 years, B14 – 31-40 years, B15 – 41-50 years, B16 – more than 50 years; B17 – smoking; B18 – alcohol intake; B19 – physical job during the life; B20 – playing sports.

C – the factors presenting technical-surgical components of operations, treatment (the experience of the surgeon, types of operations, anesthesia, section, dermal plasty, rehabilitation treatment, healing, etc.) : C1 – operated right hand; operative measure on the right hand: C2 – the partial excision of PA, C3 – total excision of PA, C4 – excision of apex of PA, C5 – excision of proximal and middle parts of PA, C6 – sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA; Common experience of the surgeon making operation on the right hand: C7 – 1-2 years, C8 – 3-5 years, C9 – 6-10years, C10 – 11-15 years, C11 – 16-20 years, C12 – 21-30 years, C13 – more than 30 years; Specialized experience of the surgeon making operation on the right hand: C14 – 1-2 year, C15 – 3-5 years, C16 – 6-10 years, C17 – 11-15 years, C18 – 16-20 years, C19 – 21-30 years, C20 – more than 30 years; Type of the anesthesia at operation on the right hand: C21 – intravenous regional, C22 – conduction, C23 – intubation narcosis, C24 – intravenous narcosis; Section type on palm of the right hand: C25 –linear, C26 – curly; section type on fingers of the right hand: C27 – linear, C28 – curly; Free dermal plasty on the right hand on: C29 – palms, C30 –

the first finger, C31 – the second finger, C32 – the third finger, C33 – the fourth finger, C34 – the fifth finger; Postoperative after treatment on the right hand: C35 – diadynamic currents, variable electric field of ultrahigh frequency, ultra-violet irradiation, C36 – electrophoresis (phonophoresis) Lydasums, C37 – physiotherapy exercises, massage, C38 – paraffin therapy, fango therapy; Healing on the right hand: C39 – primary, C40 – secondary; C41 – operated left hand; Operative measure on the left hand: C42 – partial excision of PA, C43 – total excision of PA, C44 – excision of apex of PA, C45 – excision of proximal and middle parts of PA, C46 – sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA; Common experience of the surgeon making operation on the left hand: C47 – 1-2 years, C48 – 3-5 years, C49 – 6-10years, C50 – 11-15 years, C51 – 16-20 years, C52 – 21-30 years, C53 – more than 30 years; Specialized experience of the surgeon making operation on the left hand: C54 – 1-2 year, C55 – 3-5 years, C56 – 6-10 years, C57 – 11-15 years, C58 – 16-20 years, C59 – 21-30 years, C60 – more than 30 years; Type of anesthesia at operation on the left hand: C61 – intravenous regional, C62 – conduction, C63 – intubation narcosis, C64 – intravenous narcosis; Section type on palm of the left hand: C65 – linear, C66 – curly; Section type on fingers of the left hand: C67 – linear, C68 – curly; Free dermal plasty on the left hand on: C69 – palms, C70 – the first finger, C71 – the second finger, C72 – the third finger, C73 – the fourth finger, C74 – the fifth finger; Postoperative after treatment on the left hand: C75 – dia dynamical currents, variable electric field of ultrahigh frequency, ultra-violet irradiation, C76 – electrophoresis (phonophoresis) Lydasums, C77 – physiotherapy exercises, massage, C78 – paraffin therapy, fango therapy; Healing on the left hand: C79 – primary, C80 – secondary; C81 – excision of apex of PA (on the right or left hand); C82 – the partial excision of PA on one hand and total excision of PA on other hand; C83 – the partial excision of PA on one hand and sphenoidal excision of middle part of PA with longitudinal bands of distal department of PA on other hand; C84 – section on fingers: linear + curly.

APPENDIX, SUPPLEMENT 2

Patient X.: 56 years old, case history No. 3546/101516, citizen. Complaints of the patient at entering: callosity of palmar surface of both hands, more in projections of the fourth fingers, periodic pain in these fingers after an exercise stress, a flexion contracture of the fourth fingers of both hands that frames difficulties during work and self-care. Anamnesismorbi. There were indurations on a palmar surface of left (A95) and the right hands about three years ago, then bands were formed with slow development of their flexion contracture on the fourth fingers of both hands. Indurations on foot appeared about a year ago (Leclerhose disease). X. was not treated anywhere.

Anamnesisvitae:

Past diseases: acuterespiratory diseases, brain contusion twice.

The right-handed person, smokes a little, took alcoholic drinks much. DC and Leclerhose disease were at the big brother and at the uncle (paternal father). Worked at office: mental job during one and a half year (B10); then work edas mechanic during 25 years.

The epidemiological anamnesis: X. wasn't in contact to infections. Tuberculosis, syphilis, virus hepatitis: denies. Surgical history: injury of soft tissues of the left hip. The allergologic anamnesis is not confounded. Hemotransfusions were not made earlier.

Data of physical examination:

Common status is satisfactory. Consciousness is clear. Integuments have physiological color. Tongue is pure, wet. Breath is vesicular, respiratory frequency is 16 movements in a minute, conducted from both sides. Both halves of thorax participate in breath symmetrically. Arterialpressure is 124/70 mm of mercury. Pulse is 72 beats per minute, rhythmic, filling up is satisfactory. Abdomenhas regular form, participates in the breath act, at palpation is soft, painless. Lien is not palpated. Pasternatsky symptom is negative from both sides. Liver is not palpated. Defecation and diuresis are not broken.

Status localis:

The right hand:

Visually there is a local hyperkeratosis of the oval form on palmar surface of hand in the field of distal palmar cord at level of 4 MTR joint of $0.4 \times 0.8 \times 10^{-2}m$, band is spread from area of hyperkeratosis of palm on the proximal phalanx of 4 finger. There is flexion contracture of 4 finger in MTR joint at the angle 1550.

Palpatory: there is dense band, going in direction to 4 finger and passing to the proximal phalanx of 4 finger, skin over band is thickened. On palmar surface of hand in distal palmar cord under a skin there are small local indurations: at level of 2, 3, 5 MTR joints in the form of nodes of $0,4 \times 0,6 \times 10^{-2}m$, on ulnar border of 1 finger at level of MTR joint in the form of node from $0,3 \times 0,4 \times 10^{-2}m$. Function of 1, 2, 3, 5 fingers is complete, 4 finger is flex in total volume, the extension to the angle presented above.

The left hand:

Visually: there is a local hyperkeratosis of the oval form on palmar surface of hand in distal palmar cord at level of 4 MTR joint of $0.7 \times 1.0 \times 10^{-2}m$, band is spread from area of hyperkeratosis of palm on the proximal phalanx of 4 finger. There is flexion contracture of 4 finger in MTR joint at the angle 1350.

Palpatory: there is dense band, going in direction to 4 finger and passing to the proximal phalanx of 4 finger, skin over band is thickened. On palmar surface of hand in the field of distal palmar cord under skin there are small local indurations: at level of 3, 5 of MTR joints in the form of nodes from $0.5 \times 0.7 \times 10^{-2}m$, on ulnar border of 1 finger at level of MTR joint in the form of node from $0,4 \times 0.5 \times 10^{-2}m$. Function of 1, 3, 5 fingers is complete, 4 finger is flex in a total volume, an extension to the angle presented above.

Palpatory: there are local indurations in the form of nodes on medial border of the middle of plantar surface of both feet. On the right foot: $0.3 \times 0.5 \times 10^{-2}m$, on the left foot: $0.5 \times 0.6 \times 10^{-2}m$.

Diagnosis: Dupuytren's contracture of 1, 2, 3, 5 fingers of I grade, 4 finger of II grade of the right hand; 1, 3, 5 fingers of I grade, 4 finger of II grades of the left hand. Leclerhose disease of both feet.

It is planned: to make operation on the left hand: excision of proximal and middle parts of palmar aponeurosis, band on 4 finger, dermal "Z" plasty. Surgical experience of the operating doctor is 18 years (C51).

Operation: excision of proximal and middle parts of palmar aponeurosis, band on 4 finger, dermal "Z" plasty.

Physiotherapeutic treatment is given in the postoperative period. Healing was by secondary intention (C80).

Mathematical calculation of prognosis of functional status of hand is made:

Canonical Discriminant Equation (DCE) = $-0.776 + 0.499 \cdot (1) - 1.814 \cdot (1) + 1.135 \cdot (1) + 1.075 \cdot (1) = 0.12$

According to DCE meaning = 0.127 for the given equation (Table 6, the equation No.1) we conclude that patient X. will have an excellent result of FSH recovery.

Control examination was eight years ago.

Hand function is recovered completely, the patient is happy with result, result is excellent.

Correctness of the calculation is demonstrated.