

Dupuytren Disease: European Hand Surgeons, Hand Therapists, and Physical Medicine and Rehabilitation Physicians Agree on a Multidisciplinary Treatment Guideline: Results from the HANDGUIDE Study

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Background: Multidisciplinary treatment guidelines for Dupuytren disease can aid in optimizing the quality of care for patients with this disorder. Therefore, this study aimed to achieve consensus on a multidisciplinary treatment guideline for Dupuytren disease.

Methods: A European Delphi consensus strategy was initiated. A systematic review reporting on the effectiveness of interventions was conducted and used as an evidence-based starting point for this study. In total, 39 experts (hand surgeons, hand therapists, and physical medicine and rehabilitation physicians) participated in the Delphi consensus strategy. Each Delphi round consisted of a questionnaire, an analysis, and a feedback report.

Results: After four Delphi rounds, consensus was achieved on the description, symptoms, and diagnosis of Dupuytren disease. No nonsurgical interventions were included in the guideline. Needle and open fasciotomy, and a limited fasciectomy and dermofasciectomy, were seen as suitable surgical techniques for Dupuytren disease. Factors relevant for choosing one of these surgical techniques were identified and divided into patient-related (age, comorbidity), disease-related (palpable cord, previous surgery in the same area, skin involvement, time of recovery, recurrences), and surgeon-related (years of experience) factors. Associations of these factors with the choice of a specific surgical technique were reported in the guideline. Postsurgical rehabilitation should always include instructions and exercise therapy; postsurgical splinting should be performed on indication. Relevant details for the use of surgical and postsurgical interventions were described.

Conclusion: This treatment guideline is likely to promote further discussion on related clinical and scientific issues and may therefore contribute to better treatment of patients with Dupuytren disease. (*Plast. Reconstr. Surg.* 132: 964e, 2013.)

Multidisciplinary treatment guidelines for Dupuytren disease can aid in optimizing the quality of care for patients with this disorder. Therefore, Dupuytren disease was

included in the HANDGUIDE study, a European study aimed to achieve multidisciplinary consensus on treatment guidelines for several nontraumatic hand disorders.

In Dupuytren patients, fibroproliferation of the palmar aponeurosis causes pathologic nodules and cords in the palm of the hand and flexion contractures of the digits. More men than

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Received for publication March 8, 2013; accepted July 1, 2013.

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DOI: 10.1097/01.prs.0000434410.40217.23

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. This study was realized with financial support from Fonds NutsOhra.*

women are affected,¹ and the prevalence increases with age.² The exact cause is unclear, although a genetic predisposition,^{3,4} radicals,⁵ and neoplasia⁶ have been suggested to play a causative role.

Surgical interventions (including needle or open fasciotomy and limited fasciectomy or dermofasciectomy) are the mainstays of treatment for Dupuytren disease; however, new treatment options such as collagenase injections⁷ and needle fasciotomy combined with percutaneous lipofilling⁸ have also been suggested. Until now, treatments have concentrated on reducing the symptoms rather than treating the underlying abnormality. However, to give the patient with Dupuytren disease the best treatment available, we need to know which factors influence the choice to use a specific surgical technique and to explore their relative contribution. This article presents a multidisciplinary treatment guideline for Dupuytren disease in which treatment options are discussed, as are factors that influence the choice of treatment in clinical practice.

METHODS

Steering Committee and Advisory Team

A steering committee to initiate and guide the HANDGUIDE study was composed, and consisted of a hand surgeon, a physical medicine and rehabilitation physician, and a physiotherapist. All three (Ph.D.) members have a clinical and scientific and/or epidemiologic background; they designed the questionnaires, analyzed the responses, and formulated the feedback reports. Furthermore, an advisory team (consisting of two professors of hand surgery, one professor of physical medicine and rehabilitation, and an internationally renowned hand therapist) was formed that could be consulted at any time and could give their opinions and advice as they saw fit.

Preparation of the HANDGUIDE Study

Evidence for Effectiveness of Interventions

To establish an evidence-based starting point for the HANDGUIDE study, systematic reviews were conducted on the evidence for the effectiveness of nonsurgical, surgical, and postsurgical interventions for the five nontraumatic hand disorders included in the HANDGUIDE study: trigger finger, de Quervain disease, Dupuytren disease, carpal tunnel syndrome, and Guyon canal syndrome.⁹⁻¹¹ For Dupuytren disease, searches were performed in the PubMed, EMBASE, CINAHL and PEDro databases up to February of 2009.⁹ No randomized controlled trials reporting

on nonsurgical interventions were found. Three randomized controlled trials evaluating surgery were included, but only limited (in favor of staples versus sutures in skin closure in the short term) and no evidence (when comparing modified Bruner and Z-plasty technique and when using 5-fluorouracil after excision) for effectiveness was found. One randomized controlled trial found limited evidence in favor of intermittent compared with constant compression after surgery in the short term.

Delphi Consensus Strategy

Delphi consensus strategies were performed to achieve consensus on each treatment guideline. In a Delphi consensus strategy, a series of sequential questionnaires (or rounds) is presented to a panel of experts, interspersed with controlled feedback, with the aim of achieving consensus among these experts.¹²

Selection of Experts

The study was endorsed by the Federation of European Societies for Surgery of the Hand and the European Federation of Societies for Hand Therapy. The national member associations of the Federation of European Societies for Surgery of the Hand and the European Federation of Societies for Hand Therapy selected the experts in their respective fields. Each national member association was invited to select a maximum of three representative experts per Delphi consensus strategy. In addition, some European physical medicine and rehabilitation physicians specializing in hand rehabilitation were invited to participate in this study. Selection criteria are listed in Table 1.

Procedure

The questionnaires of the Delphi rounds on Dupuytren disease included questions on the description, its symptoms, diagnosis, and interventions. Only the physicians answered questions on medication and injections, and only the hand surgeons answered questions on surgery. All remaining questions were answered by all of the experts.

A cutoff point of 70 percent was proposed in the first round of each Delphi consensus strategy, because this is often used in Delphi consensus strategies.^{13,14} In case of a consensus, this percentage was also calculated for each of the three participating professional groups. To reveal any discordant viewpoints between these groups, a remark was made in the report when fewer than 50 percent of the experts within a professional group answered in accordance with the achieved consensus.

Table 1. Experts' Criteria for Participation in the Delphi Consensus Strategy

The expert* should be a medical or allied health care professional with considerable experience in treating patients with nontraumatic hand disorders (e.g., tendinopathies, Dupuytren disease, or neuropathies).
 The expert should be considered by his or her own professional specialty to be a key person in the field of nontraumatic hand disorders.
 The expert should have basic knowledge of evidence-based practice.

*Participating hand surgeons and hand therapists participated as delegates for their respective professional association.

Target Population

The target population of the HANDGUIDE study are physicians and allied health care professionals involved in the treatment of patients with the above-mentioned hand disorders.

Delphi Consensus Strategy on Dupuytren Disease Description, Symptoms, and Diagnosis of Dupuytren Disease

First Round Questionnaire. The guideline will include short descriptions of Dupuytren disease, the *International Classification of Diseases, Tenth Revision* code, the symptoms, and its diagnostic process. In the first round, we included a description of each of these items and asked the experts whether they agree with this description.

Second, Third, and Fourth Round Questionnaires. The questions of the second, third, and fourth rounds were formulated based on the results of the first, second, and third rounds, respectively.

Interventions to Treat Dupuytren Disease

First Round Questionnaire. In the first round questionnaire, the nonsurgical, surgical, and post-surgical interventions that are reported in the (scientific) literature to be used for Dupuytren disease were listed. Nonsurgical interventions included corticosteroid injections and collagenase injections. Surgical interventions included fasciotomy (transection of cords), including needle fasciotomy, needle fasciotomy combined with percutaneous lipofilling, and open fasciotomy; and fasciectomy (excision of diseased fascial bands with or without excision of overlying skin), including limited fasciectomy and dermofasciectomy. Postsurgical treatments included instructions, splinting, and exercise therapy. The evidence for the effectiveness of each type of intervention, including the "evidence table" and the full-text of the review, was incorporated in this questionnaire.

For each intervention, questions were included about the usefulness and aim of and the

main factors for starting and discontinuing the intervention. To identify which factors influence the choice of a specific surgical technique, the experts were asked for each of these techniques separately for which patients the technique is useful. Furthermore, we invited them to mention specific advantages, and whether other important considerations should be taken into account for these techniques.

In all situations where options were suggested by the steering committee, the experts were invited to provide additional options. In this way, we aimed to avoid any limitations in the experts' choices.

Second Round Questionnaire. The factors affecting the choice of a specific surgical technique mentioned by the experts were summarized. In the second round, the experts were asked to score the associations of each of these factors with the choice of a specific surgical technique for Dupuytren disease on a visual analogue scale from 0 to 100. For questions relevant to each specific intervention for which no consensus was achieved in the first round, new questions were added in the second round.

Third and Fourth Round Questionnaires. For all factors of importance and their associations with each of the surgical techniques, the 70 percent agreement area was determined, summarized, and presented to the experts. Considering these agreement areas, conclusions were drawn and, in the third round, the experts were asked whether they agreed with these conclusions. Any remaining questions on these factors of importance, and other items for which no consensus was achieved in the second or third round, were added in the third and fourth rounds, respectively.

Analysis

After each Delphi round, for each question, we reported the number and percentages of experts who gave a certain answer and the rationale for the answers given by each expert.

RESULTS

Expert Panel

A total of 112 experts (52 hand surgeons, 47 hand therapists, and 13 physical medicine and rehabilitation physicians) from 17 European countries were selected to participate in one of the three Delphi consensus strategies of the HANDGUIDE study, which was performed between June of 2009 and December of 2012. For the Delphi consensus strategy on Dupuytren disease, 43

experts were selected (18 hand surgeons, 20 hand therapists, and five physical medicine and rehabilitation physicians). Of these, four experts did not finish any of the questionnaires. Response rates of the remaining 39 experts for rounds 1 to 4 were 92, 95, 97, and 97 percent, respectively. Table 2 lists the participating countries, the total number of experts of the HANDGUIDE study, the number of experts participating in the Delphi consensus strategy on Dupuytren disease, and years of experience with this topic.

Results of Delphi Consensus Strategy on Dupuytren Disease

Consensus

Cutoff Point for Consensus. In the first round, consensus was achieved on a cutoff point of 70 percent. In this Delphi consensus strategy, there was no discordant viewpoint between a professional group and the consensus.

Guideline for Dupuytren Disease. Four rounds were needed before consensus on the treatment guideline for Dupuytren disease was achieved. The guideline is shown in Figure 1.

Description, Symptoms, and Diagnoses of Dupuytren Disease

In the first round, consensus was achieved on the short description of Dupuytren disease, its *International Classification of Diseases, Tenth Revision* (2006) code, symptoms, and diagnosis that should be included in the guideline.

Interventions to Treat Dupuytren Disease

Experts did not add any interventions to the list of aforementioned interventions.

Nonsurgical Treatment. Consensus was achieved that corticosteroid injections are not useful for

treating Dupuytren disease. Treatment with collagenase injections may be useful for Dupuytren disease; however, more clinical experience is needed before firm conclusions regarding the effect of this treatment can be drawn.

Surgical Treatment. Consensus was achieved that the aim of surgery is to remove or decrease any flexion contracture of the affected digits to restore hand function. The experts agreed that a needle fasciotomy and an open fasciotomy, and a limited fasciectomy and a dermofasciectomy, can be used to treat Dupuytren disease. For needle fasciotomy combined with percutaneous lipofilling, more experience is needed before firm conclusions regarding its usefulness can be drawn.

For each surgical procedure found useful, consensus was achieved on the preferred method of anesthesia, the preferred sutures (if required), whether these techniques should be used as a sole method of treatment or can be combined with another surgical technique, and the main complications.

Postsurgery Period. The experts agreed on the advice that should be given during the primary postoperative period. For each of the above-mentioned surgical techniques, postsurgical rehabilitation should concentrate on instructions, splinting, and exercise therapy. The aims of each of these postsurgical treatments, and the policy to be followed when splinting or exercise therapy appears to be insufficient, were described and included in the guideline.

Postsurgical Instructions. Consensus was achieved that the patient should always receive postsurgical instructions.

Table 2. Experts and Participating Countries in the HANDGUIDE Study

Profession	Participating Countries (in alphabetic order)	Total No. of Experts in the HANDGUIDE Study	Mean No. of Experts for Dupuytren Disease	Mean Years of Experience (range)
European Federation Hand surgeons (FESSH)	Belgium, Denmark, Estonia, Finland, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden, Switzerland, Turkey, United Kingdom	52	16	17.3 (8–40)
Hand therapists (EFSHT)	Belgium, Denmark, Finland, France, Italy, The Netherlands, Norway, Slovenia, Sweden, Switzerland, Turkey, United Kingdom	47	19	18.7 (7–35)
PM&R physicians (not applicable)	Austria, The Netherlands, Portugal, Slovenia, Switzerland, Turkey	13	4	14.3 (8–17)
Total		112	39	17.5 (7–40)

FESSH, Federation of European Societies for Surgery of the Hand; EFSHT, European Federation of Societies for Hand Therapy; PM&R, physical medicine and rehabilitation.

Postsurgical Splinting. Postsurgical splinting should be performed only on indication. The experts preferred a volar or dorsal static splint. Only a minority of the experts had a clear preference for keeping the proximal interphalangeal or the distal interphalangeal joint free or extended. The experts described when postsurgical splinting should be applied and discontinued. The splint should be worn for 6 to 24 weeks during nighttime and, if necessary, also for a limited period during the daytime.

Postsurgical Exercise Therapy. The experts agreed that postsurgical exercise therapy should always be given. Exercise therapy is basically the same after each surgical technique but should be adapted to the size of the wound and its stage of healing. Consensus was achieved regarding when exercise therapy should be started and on the type, duration, and frequency of the exercises. The total duration of the exercise therapy should last 3 to 8 weeks and should be discontinued when the phase of postoperative scar contracture has passed.

Other Postsurgical Therapeutic Interventions. To indicate that the guideline focuses on the most commonly used postsurgical interventions, but that additional therapeutic modalities can be added, the experts agreed to include the following note in the guideline: “Depending on the patient’s situation and personal preferences, additional therapeutic modalities can be added, such as pressure garments for treating edema and silicone-based products for the modification of scar tissue.”

Factors Influencing the Choice for a Surgical Technique. In the first round, the experts mentioned several important factors influencing their choice of a specific surgical technique. These factors could be divided into patient-related, disease-related, and surgeon-related factors (Table 3). To clarify these factors and their association with the choice of surgery, questions on this issue were included in the second round questionnaire. The factors were scored on a visual analogue scale from 0 to 100 for each surgical technique separately (Table 4). The 70 percent agreement area for each factor was determined, and conclusions were formulated concerning the results that emerged. In the third Delphi round, we asked the experts whether they agreed with these conclusions. In the fourth round, consensus was achieved on each of these conclusions. The factors, the 70 percent agreement areas, and the conclusions

Table 3. Factors Related to the Choice of a Surgical Technique for Dupuytren Disease

Patient-related factors
Age
Comorbidity
Disease-related factors
Presence of a palpable cord
Previous surgery in the same area
Skin involvement in the area to be operated on
Recovery time
Speed of recurrence
Surgeon-related factor
Experience of the surgeon

for each of the above-mentioned factors are presented in the guideline.

DISCUSSION

In a European Delphi consensus strategy, consensus was reached on a multidisciplinary treatment guideline for Dupuytren disease. This treatment guideline may support improvements in quality and consistency in health care, and may give direction to future research.

According to the experts in this study, corticosteroid injections, collagenase injections, or other nonsurgical interventions should *not* be included in the guideline. Solitary corticosteroid injections were judged to have insufficient effect. A recent randomized controlled trial ($n = 47$), however, found significant differences in favor of steroid injection as an add-on to a percutaneous needle aponeurotomy, suggesting there may nonetheless be a role for corticosteroids in the treatment of Dupuytren contracture.¹⁵ More research on this topic is definitely requested before firm conclusions can be drawn.

Collagenase injections, although used experimentally for Dupuytren disease as early as 1996,¹⁶ were not approved until 2010 by the U.S. Food and Drug Administration for treatment of Dupuytren disease. Therefore, data on important factors (e.g., number of recurrences, long-term health effects, and possible side effects) are not yet available. Therefore, the experts of this study agreed that more information is needed before conclusions can be drawn regarding the use of collagenase injections for this disorder.

In the nonsurgical treatment of Dupuytren disease, there was also no evidence for splinting. Nevertheless, it was recently reported that nighttime extension splinting can delay the progression and potentially decrease the degree of proximal interphalangeal joint flexion contractures.¹⁷ However, this effect seems to be minor and is probably insufficient for the majority of patients.

Table 4. Explanation of the Visual Analogue Scale Scores for the Factors Related to the Choice of a Surgical Technique for Dupuytren Disease

Factors	VAS Score of 0 Indicates	VAS Score of 100 Indicates
Patient-related		
Age	0 years of age	100 years of age or older
Comorbidity	No comorbidity	Substantial comorbidity
Disease-related		
Presence of a palpable cord	A definite palpable cord	Definite not a palpable cord
Previous surgery in the same area	No previous surgery in the same area	More than 10 previous operations in the same area
Skin involvement in the area to be operated	No skin involvement	Substantial involvement of the skin
Recovery time	Fast recovery	Slow recovery
Speed of recurrence	Late recurrence	Fast recurrence
Surgeon-related		
Experience of the surgeon	No experience needed	Substantial experience needed

VAS, visual analogue scale.

Needle and open fasciotomy, and a limited fasciectomy and dermofasciectomy, can be used for Dupuytren disease. The experts agreed that for needle fasciotomy combined with percutaneous lipofilling, more experience is needed before firm conclusions can be drawn regarding its usefulness. A disadvantage of all of these methods is that they are not based on detailed knowledge of Dupuytren disease, because this is unknown. Therefore, current treatments tend to reduce the symptoms rather than treat the underlying condition.

The experts indicated that recurrent Dupuytren disease was one of the factors for choosing a specific surgical technique. However, a drawback is that the surgical methods used cannot be properly evaluated in terms of the number of recurrences, because of methodologic heterogeneity and the absence of a generally accepted definition of “recurrence.”¹⁸ Solving this problem deserves high priority. It is noteworthy that the experts implicitly take into account patient-, disease-, and surgeon-related factors. This stimulates more explicit discussion on the use of these factors in the process of improving the treatment of patients with Dupuytren disease.

The experts were unanimous that instructions and exercise therapy should always be given to patients after surgery, but had mixed feelings about the use of postsurgical splinting. Some stated that postoperative splinting is always requested, whereas others indicate that splinting should be used only in severe cases, open procedures, and (preoperative) proximal interphalangeal joint contractures (i.e., in those with increased risk of flexion contractures). These mixed opinions on postsurgical splinting reflect the scientific literature on this subject. Although postsurgical splinting is often routinely used, its effect on hand mobility and functional status has scarcely been investigated. Two recent articles^{19,20} on this topic reported no statistically significant

additional value of splinting to hand therapy at 1-year follow-up. Both authors concluded that the policy of splinting all patients after Dupuytren surgery should be reconsidered. However, for some patients, exercise therapy alone is probably insufficient for the prevention of flexion contractures, as they are likely to develop an excess of scar tissue or postoperative edema. In the latter case, it is important to add separate treatment for edema. More high-quality studies are needed to determine the most appropriate treatment after Dupuytren surgery for (sub)groups of patients.

The presented guideline is the first guideline for Dupuytren disease, which is multidisciplinary and developed on a European level. Therefore, comparison with similar conceived guidelines is impossible. Compared with the British Society for Surgery of the Hand guideline for surgical treatment of Dupuytren disease, the European HANDGUIDE study is more elaborate and detailed in that it also covers aspects such as anesthesia and postoperative treatment and does this separately for each surgical technique.

Some limitations on the use of a Delphi consensus strategy should be addressed. The results of a Delphi consensus strategy depend on the composition of the participating experts. Therefore, we included a heterogeneous group of experts. Heterogeneity can lead to better performance than homogeneity in terms of considering all relevant aspects of the topic in a decision-making process.²¹ Furthermore, the results emerging from a Delphi consensus strategy have a temporary character. When developments in clinical practice and medical science lead to new insights, the results should be reevaluated.

CONCLUSIONS

In conclusion, by using a Delphi consensus strategy, European experts agreed on a

The European HANDGUIDE study

The aim of the European HANDGUIDE study was to achieve consensus on multidisciplinary treatment guidelines for the following five non-traumatic hand disorders: trigger finger, De Quervain's disease, Dupuytren's disease, carpal tunnel syndrome, and Guyon's canal syndrome.

To establish an evidence-based starting point for the HANDGUIDE study, systematic reviews were written reporting on the evidence for effectiveness of non-surgical, surgical as well as post-surgical interventions for these five hand disorders.

Supplementary to the available evidence-based information, a Delphi consensus strategy was used to achieve consensus on each treatment guideline. In a Delphi consensus strategy a series of sequential questionnaires or rounds is presented to a panel of experts, interspersed by controlled feedback, with the aim to achieve consensus of opinions within this group of experts.

A total of 112 experts – hand surgeons, hand therapists, and PM&R physicians – from 17 countries were selected by their national member associations of the Federation of European Societies for Surgery of the Hand (FESSH) and the European Federation of Societies for Hand Therapy (EFSHT) to participate in the HANDGUIDE study. Also, a number of Physical Medicine and Rehabilitation (PM&R) physicians specialized in hand rehabilitation were added to the expert group. The HANDGUIDE study was performed between June 2009 and December 2012.

Treatment guideline for Dupuytren's disease

This guideline concerns the treatment of Dupuytren's disease. A total of 39 experts (16 hand surgeons, 19 hand therapists and 4 PM&R physicians) cooperated in the Delphi consensus strategy to achieve consensus on this treatment guideline.

For whom?

All physicians and allied healthcare professionals who are involved in the treatment of patients with Dupuytren's disease can use this guideline.



MULTIDISCIPLINARY TREATMENT

GUIDELINE FOR DUPUYTREN'S DISEASE

Initiative and organisation:

This guideline is part of the HANDGUIDE study, which was initiated and organised by the Erasmus MC -University Medical Center Rotterdam, department of Rehabilitation Medicine & Physical Therapy. This study is supported by the FESSH and the EFSHT.

Project group:

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Symptoms of patients

Patients suffering from Dupuytren's disease generally experience slowly developing nodules, indentations or cords under the skin in the palm of the hand, eventually causing a progressive flexion contracture of the affected digit.

Diagnosis

History and physical examination: The initial diagnosis of Dupuytren's disease is usually made on the basis of patient history and the clinical symptoms described above.

Description of Dupuytren's disease

Dupuytren's disease is a fibroproliferative disorder of unknown aetiology that often results in shortening and thickening of the palmar fascia, leading to permanent and irreversible flexion contracture(s) of the digit(s).

ICD-10 (2010)

- Soft tissue disorders (M60-M79)
- M72 Fibroblastic disorders
- M72.0 Palmar fascial fibromatosis (Dupuytren)

Fig.1. (Continued)

INTERVENTIONS	II SURGICAL TREATMENT ⁴		
<p>I Non-surgical interventions^{1,2,3}</p> <p>II Surgical interventions</p> <p>IIA Fasciotomy: transection of cords</p> <ol style="list-style-type: none"> 1 Needle fasciotomy, 2 Open fasciotomy. <p>IIIB Fasciotomy: excision of diseased fascial bands (with or without excision of overlying skin)</p> <ol style="list-style-type: none"> 3 Limited fasciotomy, 4 Dermofasciotomy. <p>III Post-surgical interventions</p> <ol style="list-style-type: none"> 1 Instructions for the patient, 2 Splinting, 3 Exercise therapy. 	<p>Aim of surgery: To remove or decrease flexion contracture of the affected digits in order to restore hand function.</p> <p>IIA FASCIOTOMY</p> <p>1. Needle fasciotomy⁵</p> <p>Preferable anaesthesia technique: With local anaesthesia.</p> <p>Most important complications: Tendon, nerve and vessel damage.</p> <p>Post-operative rehabilitation after a needle fasciotomy should focus on: 1. Instructions, 2. Splinting, 3. Exercise therapy.</p> <p>2. Open fasciotomy⁵</p> <p>Preferable technique:</p> <ul style="list-style-type: none"> – Anaesthesia technique: Regional anaesthesia, – Incision: Bruner type, – Sutures: Non-resorbable. <p>Most important complications: Tendon, nerve and vessel damage and skin problems.</p> <p>Post-operative rehabilitation after an open fasciotomy should focus on: 1. Instructions, 2. Splinting, 3. Exercise therapy.</p>	<p>IIIB FASCIECTOMY</p> <p>3. Limited fasciotomy⁵</p> <p>Preferable technique:</p> <ul style="list-style-type: none"> – Anaesthesia technique: Regional anaesthesia, – Incision: Brunner type, – Sutures: Non-resorbable. <p>Most important complications: Tendon, nerve and vessel damage, skin problems, and infections.</p> <p>Post-operative rehabilitation after a limited fasciotomy should focus on: 1. Instructions, 2. Splinting, 3. Exercise therapy.</p> <p>4. Dermofasciotomy⁶</p> <p>Preferable technique:</p> <ul style="list-style-type: none"> – Anaesthesia technique: Regional anaesthesia, – Incision: It is emphasized that complete removal of involved skin is important in a dermofasciotomy. A transversal, longitudinal, or Brunner-type incision is the preferable incision for this exposure, – Sutures: Non-resorbable. <p>Most important complications: Tendon, nerve and vessel damage, skin problems, infections, and skin necrosis.</p> <p>Post-operative rehabilitation after a dermofasciotomy should focus on: 1. Instructions, 2. Splinting, 3. Exercise therapy.</p>	<p>Primary post-operative care after surgery to treat Dupuytren's disease</p> <p>During the primary post-operative period advice for the patient consists of:</p> <ol style="list-style-type: none"> 1 Elevating the hand, i.e. keeping the hand above heart level to prevent swelling, 2 Wound care, 3 Use the hand as 'normally' as possible; in the case of a limited or dermofasciotomy, this will entail moving the fingers. <p>Factors that influence the choice of a specific surgical technique⁷</p> <p>Patient-related factors:</p> <ol style="list-style-type: none"> 1 Age, 2 Co-morbidity. <p>Disease-related factors:</p> <ol style="list-style-type: none"> 3 Presence of a palpable cord, 4 Previous surgery in the same area, 5 Skin involvement in the area to be operated, 6 Recovery time, 7 Speed of recurrence. <p>Surgeon-related factor:</p> <ol style="list-style-type: none"> 8 Experience of the surgeon.

¹ Corticosteroid injections cannot be used in the treatment of Dupuytren's disease.

² Treatment with collagenase injection to treat Dupuytren's disease may be useful; however, more experience is needed before firm conclusions can be drawn about the effects of this treatment.

³ No other non-surgical treatments were considered to be suitable for Dupuytren's disease.

⁴ Currently there is too little experience with needle fasciotomy combined with percutaneous lipofilling to treat Dupuytren's disease to be included in the guideline. More experience is needed before a firm conclusion can be drawn about the usefulness of this treatment.

⁵ This surgical technique can be used as either sole treatment of combined with another form of treatment.

⁶ Dermofasciotomy can be used combined with another form of treatment. The dermofasciotomy – with or without the use of (secondary) surgical treatments focusing on skin closure such as skin grafts or flaps – can also be used as a sole (primary) surgical treatment for Dupuytren's disease.

⁷ All factors were scored on a VAS-score (0-100) and divided in 12 groups including 0 and 100 as separate groups.

Fig. 1. (Continued).

Factors related to the choice of a specific surgical technique for Dupuytren's disease

1 Age

VAS-score (0-100); 0: indicated 0 years of age; 100: indicates ≥100 years of age

Age range in years	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

Although all four surgical techniques (i.e. needle fasciotomy, open fasciotomy, limited fasciotomy and dermofasciotomy) are used to treat Dupuytren's patients, the emphasis for elderly patients is on needle fasciotomy and for younger patients on dermofasciotomy.

2 Co-morbidity

VAS-score (0-100); 0: indicates no co-morbidity; 100: indicates substantial co-morbidity

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

In case of substantial co-morbidity, a needle fasciotomy is preferable. In all other cases all the surgical techniques can be considered.

3 Presence of a palpable cord

VAS-score (0-100); 0: indicates a definite palpable cord; 100: indicates definitely not a palpable cord

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

In case of a definite palpable cord performing a needle fasciotomy or a limited fasciotomy is preferable. In case of no clear palpable cord, all the surgical techniques (except a needle fasciotomy) are applicable. In case of a virtually absent palpable cord, an open fasciotomy or a dermofasciotomy is preferred.

4 Previous surgery in the same area

VAS-score (0-100); 0: no previous surgery in the same area; 100: >10 previous surgeries in the same area

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

A higher rate (>6) of previous surgeries in the same area is mainly associated with a dermofasciotomy. The lowest rate (i.e. no previous surgeries in the same area) is associated with a needle fasciotomy or a limited fasciotomy. In case of 4-5 previous surgeries in the same area, the emphasis is on an open fasciotomy, a limited fasciotomy and a dermofasciotomy, and for 1-3 previous surgeries on a needle fasciotomy, an open fasciotomy and a limited fasciotomy.

Fig.1. (Continued).

Factors related to the choice of a specific surgical technique for dupuytren's disease

5 Skin involvement in the area to be operated

VAS-score (0-100); 0: no skin involved; 100: substantial involvement of the skin

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

A substantial involvement of the skin in the area to be operated is mainly associated with a dermofasciotomy. No skin involvement is mainly associated with a needle fasciotomy or a limited fasciotomy.

6 Recovery time

VAS-score (0-100); 0: fast recovery; 100: slow recovery

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

A fast recovery time is mainly associated with a needle fasciotomy. An open fasciotomy and a dermofasciotomy are associated with the slowest recovery time.

7 Speed of recurrence

VAS-score (0-100); 0: late recurrence; 100: fast recurrence

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

Regarding all four surgical techniques, a needle fasciotomy is mainly associated with a fast recurrence and a dermofasciotomy with a late recurrence.

8 Experience of the surgeon

VAS-score (0-100); 0: no experience needed; 100: considerable experience required

Range (VAS-score)	0	1-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100
Needle fasciotomy												
Open fasciotomy												
Limited fasciotomy												
Dermofasciotomy												

Regarding the association between the 'experience of the surgeon' and the choice of a surgical technique, the 70% agreement area indicated by the experts shows that for all surgical techniques considerable experience is required. The least amount of experience is required for a needle fasciotomy and the most experience is required for a dermofasciotomy.

DISEASE-RELATED FACTORS

SURGEON RELATED FACTORS

Fig.1. (Continued).

III POST-SURGICAL TREATMENT⁸

<p>1. Instructions for the patient</p> <p>Aim of post-surgical instructions: To avoid activities that cause mechanical irritation of the operated part of the hand, to decrease pain and swelling, and to facilitate wound healing and mobility of the hand and fingers.</p> <p>Patients who have undergone surgery to treat Dupuytren's disease should always receive instructions.</p>	<p>surgery as soon as (and only if) the condition of the wound allows this.</p> <p>Duration of wearing the splint: The splint should be worn during the nighttime for 6-24 weeks, depending on the individual patient. If necessary, splinting can also be indicated for a limited daytime period.</p>	<p>1. Passive and active extension of the fingers, 2. Tendon gliding exercises, 3. Strengthening and stretching of the mm. interossei.</p> <p>Exercise therapy is basically the same after each surgical technique, but should be modified according to the extent of the wound and its stage of healing.</p>
<p>2. Splinting</p> <p>Aim of post-surgical splinting: To keep the operated fingers straight and prevent recurring flexion contracture development due to normal postoperative scar tissue.</p> <p>Post-surgical splinting should only be performed on indication.</p> <p>Kind of splint: A volar or dorsally applied static splint.</p> <p>The volar or dorsal applied static splint is preferable because it is easy for the patient to wear, easy for the therapist to manufacture, and is sufficient when worn only during the night. A dorsal static splint is preferable in case of wound problems on the volar site of the hand. A volar, static splint can have a positive effect on the appearance of post-operative scar tissue.</p>	<p>When should splinting be stopped? When there is no longer a risk of contracting post-operative scar tissue.</p> <p>If splinting is insufficient:</p> <ol style="list-style-type: none"> 1. Evaluate your treatment and, if necessary, adjust the splint therapy (e.g. another splint, frequency of wearing the splint), 2. Start exercise therapy, 3. If necessary, a new (type of) surgery should be considered. 	<p>When starting? Exercise therapy should be started as soon as possible (i.e. within 0-7 days after surgery), assuming that pain, swelling, and skin healing permits this.</p> <p>Duration of exercise therapy: Exercise therapy after Dupuytren's surgery should last 3-8 weeks.</p> <p>Frequency of exercise therapy: An exercise day program should be performed with a frequency of 3-5 times a day for 15-25 min. per session (with a maximum of 80 min. per day).</p>
<p>3. Exercise therapy</p> <p>Aim of post-surgical exercise therapy: To keep the operated fingers straight and prevent recurring flexion contracture development due to normal postoperative scar tissue. Further, this is used to reduce post-operative edema and restore normal joint mobility of the fingers.</p> <p>Exercise therapy should always be given to patients who have undergone surgery to treat Dupuytren's disease.</p> <p>Exercise therapy should consist of (depending on pain and wound healing):</p>	<p>When should exercise therapy be stopped? When there is no longer any risk of contracting post-operative scar tissue.</p> <p>What to do in case post-surgical exercise therapy is insufficient?</p> <ol style="list-style-type: none"> 1. The post-surgical intervention program should be re-evaluated. If necessary, splinting can be added or intensified or (a new type) surgery can be considered, 2. The patient should be 're-evaluated' taking into account the recovery process of the disease and the patient's compliance. 	<p>When should exercise therapy be stopped? When there is no longer any risk of contracting post-operative scar tissue.</p> <p>What to do in case post-surgical exercise therapy is insufficient?</p> <ol style="list-style-type: none"> 1. The post-surgical intervention program should be re-evaluated. If necessary, splinting can be added or intensified or (a new type) surgery can be considered, 2. The patient should be 're-evaluated' taking into account the recovery process of the disease and the patient's compliance.

⁸ Depending on the patient's situation and personal preferences, additional therapeutic modalities can be added, such as pressure garments for treating edema and silicon-based products for the modification of scar tissue.

Fig. 1. Treatment guideline for Dupuytren disease.

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Financial support:

This guideline was realised with financial support from Fonds NutsOhra, The Netherlands

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multidisciplinary treatment guideline for Dupuytren disease. A number of surgical and postsurgical interventions were found to be suitable and are included in the guideline. This is the first time that a multidisciplinary treatment guideline was developed in cooperation with experts from all over Europe and that these experts specifically identified patient-related, disease-related, and surgeon-related factors and their association with the choice of surgery. Although the exact nature of Dupuytren disease remains unclear, we hope that the guideline will promote further discussion on related clinical and scientific issues that may contribute to better treatment of our patients with Dupuytren disease.

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ACKNOWLEDGMENTS

The authors thank the following organizations and persons for their participation in the HANDGUIDE study. Selection of the experts for the Delphi consensus: the Federation of European Societies for Surgery of the Hand, the European Federation of Societies for Hand Therapy, and their national member associations. The European HANDGUIDE group, consisting of the experts participating in the Delphi consensus strategy on Dupuytren disease: Hand surgeons: L. Antonio, J. Arandes, M. Calcagni, I. Degreef, M. Forsman, M. Jung, S. Larson, M. Levadoux, J. van Loon, E. Mackenney, C. Mathoulin, A. Odinson, A. Schuurman, S. Watson, T. Weis, and S. Wilbrand. Hand therapists: T. Aglen, T. Berkhout, S. Boel, Z. Clift, C. Cotroneo, C. Flodmark, B. Hilmand, C. Le Lardic, D. Larson, E. De Luca, T. Lurie, M. Marincek, C. Mayor, S. Mee, M. Neving, M. Petelet, H. Puggaard, L. Vergouwen, and A. Videler. Physical medicine and rehabilitation physicians: T. Duruoz, A. Felc, L. Gonçalves, and C. van der Sluis. Their participation in this project does not necessarily mean that they fully agree with the final achieved consensus. The European HANDGUIDE group: this group consisted of the experts (hand surgeons, hand therapists, and physical medicine and rehabilitation physicians) who participated in the Delphi consensus strategy that resulted in consensus on the treatment guideline of trigger finger. The treatment guideline for Dupuytren disease is the result of a *communis opinio*. The authors also thank the following from Erasmus Medical Center: S. E. R. Hovius, M.D., Ph.D., and H.

J. Stam, M.D., Ph.D., for being part of the advisory team; A. R. Schreuders, P.T., Ph.D., for being part of the advisory team and for cooperation in the initiation of this research project; and J. Soeters, P.T., for being our webmaster.

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