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## Review Article

# Dupuytren's Disease—Etiology and Treatment

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## Summary

**Background:** The worldwide prevalence of Dupuytren's disease (DD) is 8%. DD is a chronic disease for which there is no cure. Various treatments are available.

**Methods:** This review is based on pertinent publications retrieved by a selective search in PubMed and Embase.

**Results:** Genetic factors account for 80% of the factors involved in causing this disease. Diabetes mellitus, hepatic diseases, epilepsy, and chronic occupational use of vibrating tools are also associated with it. Limited fasciectomy is the most common treatment and is considered the reference standard. Possible complications include persistent numbness in areas where the skin has been elevated, cold sensitivity, and stiffness, with a cumulative risk of 3.6–39.1% for all complications taken together. The recurrence rate at 5 years is 12–73%. Percutaneous needle fasciotomy is the least invasive method, with more rapid recovery and a lower complication rate than with limited fasciectomy. 85% of patients have a recurrence after an average of 2.3 years. Radiotherapy can be given before contractures arise in patients with high familial risk, or postoperatively in selected patients with a very high individual risk of recurrence.

**Conclusion:** Although DD is not curable, good treatments are available. Recurrences reflect the pathophysiology of the disease and should not be considered complications of treatment. When counseling patients about the available treatment options, particularly the modalities and timing of surgery, the physician must take the patient's degree of suffering into account. Nowadays, fast recovery from surgery and less postoperative pain are a priority for many patients. Different surgical methods can be used in combination. It remains difficult to predict the natural course and the time to postoperative recurrence in individual patients; these matters should be addressed in future studies.

## Cite this as:

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Dupuytren's disease is characterized by progressive idiopathic fibrosis of the palmar aponeuroses of the hands, leading to extension deficit in the fingers and the formation of nodules. Its course can vary greatly between individuals. The staging is shown in *Table 1*.

Dupuytren's disease is a chronic disease and cannot be cured by surgery. Surgical resection may be followed by a remission that lasts for years or by early recurrence. The causes of early recurrence remain

disputed. Hueston introduced the concept of diathesis (1). Factors such as a positive family history, bilateral disease, age at onset below 50 years, the presence of concomitant diseases such as Ledderhose's disease (idiopathic fibrosis of the plantar aponeurosis), Peyronie's disease (induratio penis plastica), and Garrod's pads ("knuckle pads" or "Garrod's nodules") are predictors of recurrence. The histology of resected tissue can also indicate a high risk of recurrence, e.g., if the fibrotic tissue shows high cellularity and mitosis (Rombouts type 1) (2, 3).

## Prevalence and incidence

A recent meta-analysis calculated a worldwide prevalence of approximately 8% (4). The highest reported prevalence rates are 17% in Africa, 15% in Asia, 10% in Europe, and 2% in the Americas. Men are 3 to 4 times more likely to be affected than women, and the

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TABLE 1

**Staging of Dupuytren's disease**

Stage	Tubiana*: Total extension deficit of all joints in the most affected finger	Meyerdig	Iselin
0	No fibrosis or extension deficit		
N	Fibrosis, no extension deficit		
N/1	Fibrosis, extension deficit up to 10°		
1	Fibrosis, extension deficit up to 45°	Fibrosis without functional impairment	Fibrosis in the palm without extension impairment
2	Fibrosis, extension deficit 45°–90°	Fibrosis with mild contracture in the MCP joint	Fibrosis with contracture in the MCP joint
3	Fibrosis, extension deficit 90°–135°	Fibrosis in the PIP joint, contractures in the MCP and PIP joints	Fibrosis with contracture in the MCP and PIP joints
4	Fibrosis, extension deficit greater than 135°	Hyperextension contracture of the DIP joint	Fibrosis with advanced contracture in the MCP and PIP joints and hyperextension of the DIP joint

\*In the Tubiana classification, some lesions can be characterized more precisely by the use of single-letter abbreviations as follows: N, nodule or cord in the palm without flexion contracture; P, lesion mainly localized in the palm; D, lesion mainly localized on the finger

incidence per 10 000 head of population increases with age, rising from approximately 5 in the age group below 50 years to 15 (50–59 years), 30 (60–69 years), and finally 40 (70–79 years) (4, 5).

**Etiology and risk factors**

Complex genetic analyses carried out by Ng and others showed no evidence to support the previously postulated theory associating Dupuytren's disease with Nordic or "Viking" ancestry (6–8).

It is now known that Dupuytren's disease is caused by interactions between multiple genes that are expressed variably and in a delayed manner. The Genome-Wide Association Study (GWAS) identified 26 genomic regions associated with Dupuytren's disease (6, 9), and this is probably just the tip of a genetic iceberg (9). A cohort study of over 30 000 Danish pairs of twins showed that the heritability of Dupuytren's disease is around 80% (10). Among 730 men with Dupuytren's disease, the prevalence of plantar fibromatosis (Ledderhose's disease) was 16% (plastic surgeons' assessment) or 22% (patients' assessment). The prevalence of induratio penis plastica (Peyronie's disease) was assessed at 7.8% and 8.8%, respectively (11).

Additional associations exist with particular diseases such as diabetes mellitus (types 1 and 2) (odds ratio [OR] 3.06, 95% confidence interval [2.69; 3.48]), liver disease (OR 2.92 [2.08; 4.12]), and epilepsy (OR 2.80 [2.49; 3.15]); no specific form of epilepsy or anticonvulsant medication has been identified (12). Other factors that can be influenced by lifestyle changes appear also to play a role in the expression of the phenotype (13). Increased alcohol consumption is associated with an OR of 1.71 [1.25; 2.33] (14).

Working with vibrating tools for many (>15) years ("vibration exposure") is also significantly associated with Dupuytren's disease, with an OR of 2.87 [1.41; 5.84] according to a recent meta-analysis (15, 16). Age, too, seems to be of relevance: a cohort study of 23 795 persons showed a clear association between Dupuytren's disease and manual labor for those younger than 60 years (adjusted OR 2.08 [1.03; 4.2]), but not for those over the age of 60 (17). Further studies are needed to determine the exact connection between vibration and Dupuytren's disease. However, the existing evidence is robust enough for patients to be informed of these findings to help guide their decision making in relation to both work and leisure.

**Anatomy of the fascia of the hand and fingers**

In recent years, microanatomical dissections prompted by discordances between previously familiar anatomical descriptions and intraoperative findings have shed new light on the anatomy distal to the transverse ligament of the palmar aponeurosis (18). These new findings are clinically significant and must be taken into account when options for surgical treatment are being considered. Details are given in the *eBox*. When affected by Dupuytren's disease, the course of the palmodigital spiral system results in a spiral course of the digital nerves, which can lead to intraoperative nerve injury (19–21) (*Figure 1*).

**Surgery**

Although the resections are performed in the area of the palmar aponeurosis, the surgical procedures have become known by the term "fasciectomy."

Once it emerged in the 1960s that radical fasciectomy (RF), by which surgeons had hoped to prevent recurrence by removing all the fascial tissue, was not

TABLE 2

**Overview of treatment options, escalating from conservative to surgical, showing results, recurrence rates, complications, and return-to-work**

Treatment (references)/ levels of evidence <sup>*3</sup>	Indication	Result <sup>*1</sup>	Wound healing/ return to work <sup>*2</sup>	Complications (primary interventions) <sup>*5</sup>	Recurrence rate <sup>*1</sup>	Disadvantages <sup>*1</sup>
<b>Conservative</b>						
Padded fingerless gloves	Palmar fibrosis with no contracture	Symptom relief	–	–		
Radiotherapy (49–54) Cohort studies Oxford level of evidence 2b	Early stage, preventive (may be an option postoperatively in aggressive disease)	Significant slowing of progression		Erythema 25% Dry skin 2.5% Very rarely triggers malignant tumor	20% after 8.5 years for Tubiana stages N and N/1, for later stages 80% after 8.5 years	Multiple sessions  (Low) risk of tumor induction
Collagenase (41–43, 46) RCTs Oxford level of evidence 1b	Currently not licensed in Germany	60%–85% reduction of flexion contracture	1–10 days	<b>Cumulative rate 78%<sup>*4</sup></b> Local edema 62% Hematoma 25% Skin wounds 24% Lymph node enlargement 15% Tendon damage 4%	65% in 3 years 80% in 7.5 years	Expensive  Efficacy varies between individuals Relatively high recurrence rate
<b>Surgical</b>						
Percutaneous needle fasciotomy (24, 25, 32–39, 46) RCTs Oxford level of evidence 1b	Cords with flexion contracture Patients wanting rapid return of function after treatment	65%–85% reduction of flexion contracture	1–5 days	<b>Cumulative rate 19%<sup>*4</sup></b> Skin wounds 20% Local edema 6% Nerve damage 2% Infection 1% CRPS 1% Vascular damage < 1% Lymph node enlargement 0%	65% in 32 months	Relatively high recurrence rate
Selective/limited fasciectomy (23–27, 29–31, 46) Cohort studies Oxford level of evidence 2b	> 20–30° flexion contracture	80% reduction of flexion contracture	2–4 weeks	<b>Cumulative rate 17%</b> Local edema 10% CRPS 10% Joint stiffness 10% Flap necrosis 10% Infection 7% Wound dehiscence 5% Vascular damage 4% Nerve damage 3% Hematoma 3% Skin wounds 1%	12%–73% in 5 years	Complications causing greater long-term impairment than PNF or collagenase  Longer wait until function is restored
Dermofasciectomy (24, 25, 40, 41, 46) Case series/cohort study Oxford level of evidence 2b/4	Recurrence after SF/LF Aggressive disease in young patients with risk factors	Comparable to SF/LF	3–8 weeks	<b>Cumulative rate 12%</b> Wound dehiscence 10% Skin wounds 8% CRPS 4% Vascular damage 6% Nerve damage 6% Hematoma < 1% Infection 0%  Local edema n.d. Joint stiffness n.d.	8.4% in 6 years	Loss of sensitivity in the grafted area  Scar at the skin graft donor site  Longer wait until function is restored

<sup>\*1</sup> Percentages and times given are based on different study populations and are therefore not fully comparable; in some cases, mean values from several studies are given.

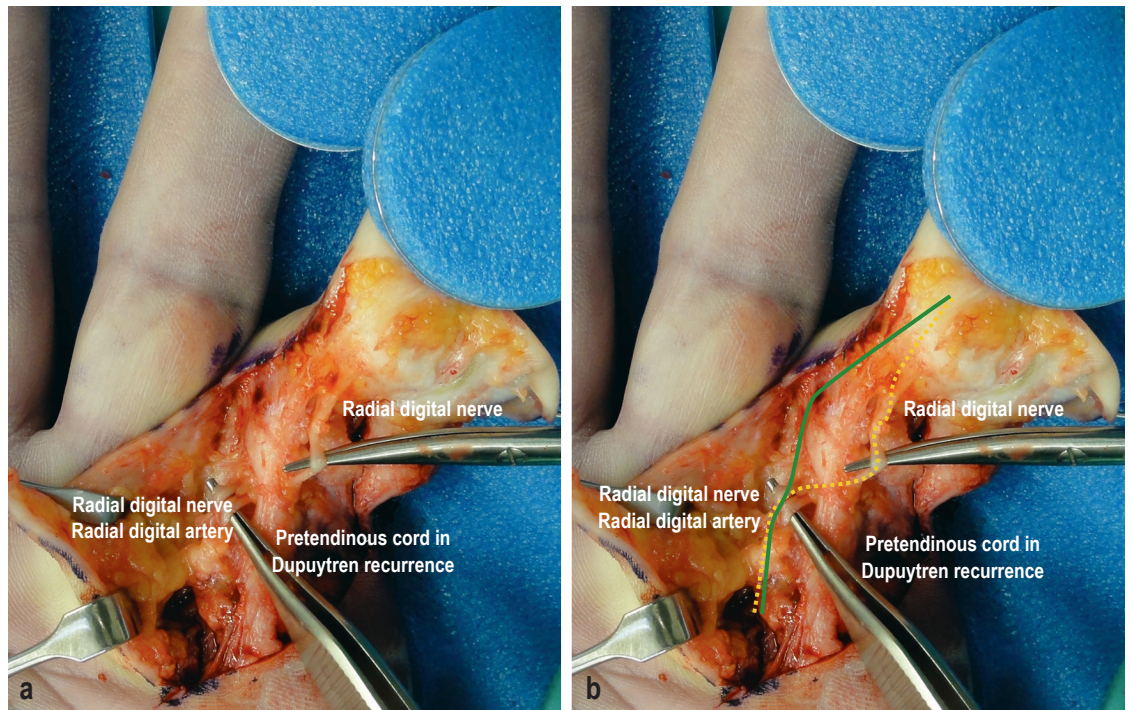
<sup>\*2</sup> Mean empirical values without complications for light manual work are given; for heavy manual work with maximum load the time, where this is given, is longer for all treatments. There are no robust figures on this in the literature.

<sup>\*3</sup> Regarding the level of evidence, a Cochrane review (24) and one other systematic review (25) are available. For each treatment technique, the level of evidence given is based on the quality of the studies available for that technique.

<sup>\*4</sup> For the minimally invasive procedures (PNF and CCH), in some studies recurrences that occurred during the follow-up period were counted as complications, significantly increasing the cumulative incidence. Even complications not requiring treatment, such as skin tears for PNF and local swelling for collagenase, were carefully recorded.

<sup>\*5</sup> The incidence of complications increases 10-fold for interventions for recurrent disease, except after previous treatment with PNF or CCH (27).

CCH, collagenase *Clostridium histolyticum* (CCH treatment); CRPS, complex regional pain syndrome; LF, limited fasciectomy; n.d., no data; PNF, percutaneous needle fasciotomy; RCT, randomized controlled trial; SF, segmental fasciectomy



**Figure 1:** Intraoperative photograph of recurrent Dupuytren's disease in the left little finger, showing a) spiral course of the radial digital nerve; b) here this spiral nerve is marked with yellow dots; the normal anatomical course of the radial digital nerve is shown in green.

only noncurative but also morbidity-prone (22), less radical resections were introduced, such as limited fasciectomy (LF, with various incisions) or segmental fasciectomy (SF), in which only 1-cm segments of the pathological cords are removed (23). The most recently introduced procedures are minimally invasive: percutaneous needle fasciotomy (PNF) and injections of collagenase obtained from *Clostridium histolyticum* (CCH).

There is still a lack of high-quality studies comparing several different options for treatment (24, 25). Randomized controlled trials between single techniques have been carried out and are described below.

At present, limited fasciectomy (LF) remains the commonest treatment for Dupuytren's disease (23) and may be considered the reference standard. Its popularity is due to several reasons. Ultimately, most patients are satisfied with the outcome, since the hands operated on mostly regain good function. Wound healing and scar maturation often take a long time, interfering with daily work and leisure activities, but nevertheless, patients generally accept the inconvenience because of the satisfactory esthetic improvement (26).

Possible complications include persistent numbness in areas where the skin has been lifted, sensitivity to cold, and stiffness, with a cumulative risk of 3.6%–39.1%; in terms of serious complications such as nerve injury or the like, the cumulative risk is 15.7% (27). The recurrence rate at 5 years ranges

from 12% to 73%, and early recurrences also occur despite surgery (28). Some patients are so disappointed by this that they refuse further surgical intervention and accept their limited finger extension.

Less invasive techniques are associated with a significantly shorter recovery time and therefore deserve a place in the repertoire of every hand surgeon.

We therefore describe the alternatives to LF in terms of ability to straighten the fingers (efficacy), patient-reported outcome measures (PROMs), complications, duration of wound healing, and durability of the outcome.

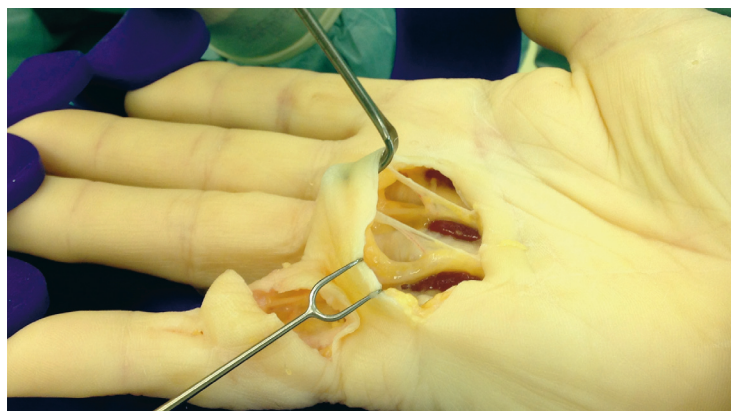
With segmental fasciectomy (SF), the reported overall complication rate is lower, with a cumulative risk of 0–5.6%, although the reporting in the available studies is of poorer quality. The advantages of SF are mainly faster recovery with less postoperative pain (29, 30). Whether incomplete resection of the cord is associated with a higher risk of recurrence than after LF has not been investigated in high-quality comparative studies. Available cohort studies (Oxford level of evidence 2b) have not yet provided any evidence for this, nor any regarding long-term outcomes, although control groups are lacking (29–31).

Percutaneous needle fasciotomy (PNF) is the least invasive surgical procedure. High-quality studies (Oxford level of evidence 1b) over the past 15 years show that for contractures up to 90° PNF has a similar efficacy to LF. However, recovery is much faster, with a lower complication rate of 0% for PNF

compared with 5% for LF (32–35). The disadvantage of PNF is the shorter time to progression/recurrence (85% recurrence after a mean of 2.3 years) compared with LF (23.8% recurrence after a mean of 3.7 years) (34). However, this is usually not a problem, as the treatment can be repeated to similar good effect without increasing the risk of complications. In addition, LF can usually be performed as safely after PNF as when it is performed as the primary procedure (36, 37). However, if the cords are wider (“logs” versus “twigs” [38]), the possibility that an extension deficit can be corrected by PNF seems limited. Even so, PNF may be performed by skilful hands. For example, in safe locations (for example, the palm) a thicker needle can be used to release the skin from fibrosis in the horizontal plane, reducing the risk of skin tears. Even when PNF is performed “blind” there is no need, if it is done correctly, to anticipate an increased risk of injury to vessels or nerves (39). The cost of PNF is significantly lower than that of any other surgical treatment for Dupuytren’s disease (40).

Chemical cleavage by injection of collagenase has been discontinued almost everywhere because of the cost of the drug relative to its effectiveness and the recurrence rate. Its efficacy proved to be comparable to that of PNF. The efficacy has been studied in several randomized controlled trials, and the longer the follow-up, the more similar the recurrence rates became. After three years, recurrence rates were identical, with a remaining total extension deficit of 15° after PNF and 28° after collagenase injection ( $P = 0.05$ ) (e1–e3). Collagenase injection is indicated, for example, in patients with recurrence after multiple LF with wide cords (“logs” versus “twigs”) (38), or in already neurovascularly compromised fingers with a functionally limiting extension deficit. However, the drug would have to be ordered from abroad as it is not available in Germany.

The most radical treatment is dermofasciectomy (DF) with skin grafting, which may be considered as the last resort in patients with recurrences after LF or those with severe primary disease (e4, e5). This procedure involves removal of the skin together with all affected tissue palmar and just dorsal to the neurovascular bundles and palmar to the tendon sheath on the flexor aspect of the finger. Some surgeons replace the skin of the proximal segment of the finger, others to above the middle phalanx. Another group uses smaller “firebreak” grafts, i.e., they only graft small areas, which causes fewer problems if the skin graft dies; however, it does mean that a smaller amount of pathologic tissue can be removed. Firebreak grafts do not appear to prevent recurrences any better than is achieved by LF without skin grafting (24). So far, no robust comparative studies have been carried out on outcomes of DF, including its different techniques. DF remains reserved for aggressive disease and recurrences. Wound healing takes longer than with LF and sensitivity is lost in the grafted area.



**Figure 2:** Intraoperative findings after limited fasciectomy. The palmar skin was not opened up completely, so that perforators of the vessels that travel with dermal nerve branches to the skin can be spared, contributing to better wound healing. Apart from this, a limited fasciectomy was carried out removing all affected fascial structures in the operative area.

Cumulative complication rates were 17.4% [11.7; 23.1] for LF, 18.9 [–5.5; 43.3] for PNF, 78.0 [59.6; 96.4] for CCH injection, and 11.6 [0.0; 23.2] for DF (only a tenth of the number of patients were included for the latter) (e6). In relation to the minimally invasive procedures (PNF and CCH), some studies counted recurrences as a complication. The incidence of complications rises 10-fold for procedures to treat recurrences, with nerve injuries increasing in particular (27).

### Postoperative splint treatment

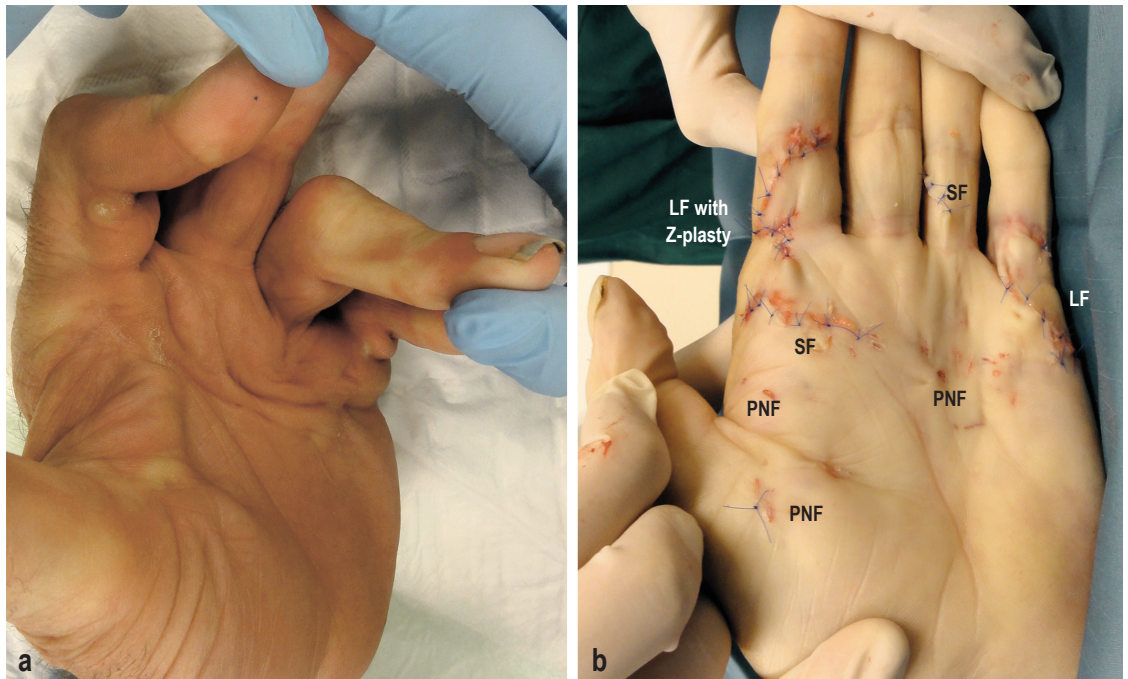
Regarding rehabilitation after surgery, there is no high-quality evidence for the efficacy of night splints after LF or DF (24, e7, e8).

After PNF, in which the fibrosis is only divided but not removed, clinical experience suggests that night position splints or immobilizing gloves can stabilize the results, but no robust study data exist.

### Radiotherapy

Radiotherapy is very effective in inhibiting proliferating fibroblasts and can “freeze” early stages of disease, and at least delay progression of more advanced stages.

In Tubiana stage N (fibrosis without flexion contracture) and N/1 (extension deficit 1° to 10°), there is very good evidence for the efficacy of radiotherapy, with approximately 80% disease control and 25% remission (e9–e11). For more pronounced flexion contractures (up to 45°), significantly lower efficacy of radiotherapy has been described: higher rates of renewed progression are reported as follow-up time increases. Therapeutically, various fractionation regimens have become established, for example, 30 Gy in 2 series of 5 fractions versus 21 Gy in 1 series of 7 fractions (e12). Acute side effects reported were a transient skin reaction in 25% of patients and temporary dry desquamation in 2.5%. In 14%, skin dryness occurred as a late complication (e12).



**Figure 3:** Example of the use of “modular technique” combining SF, LF with skin transposition, and PNF  
 a) Preoperative photograph: 67-year-old patient with advanced primary Dupuytren’s disease Tubiana or Iselin stage 4 (diabetic, heavy smoker, wheelchair-dependent)  
 b) Intraoperative result after a procedure combining percutaneous needle fasciotomy, fasciectomy, and limited fasciectomy with Z-plasty. Minimally invasive PNF was combined with SF and LF including local Z-plasty, achieving a good result for the patient without major surgery and without skin grafting. The patient wanted to be able to use his wheelchair independently again, which had become impossible because of the contractures, but preferred to avoid major surgery if possible as he was aware that he was at high risk of wound healing problems. The surgical areas where each technique was used are marked in the image on the right.  
 LF, limited fasciectomy; PNF, percutaneous needle fasciotomy; SF, segmental fasciectomy

Regarding adjuvant radiotherapy to prevent recurrence after surgery, no data exist from prospective or randomized studies. However, in patients at high risk of recurrence, radiotherapy can be carried out as an “individualized attempt at healing” once wound healing is complete, based on close consultation between patient, surgeon, and radiotherapist.

With ionizing radiation there is always the possibility that mutations and hence potentially fatal tumors can be triggered, and for this reason it is very important to assess this risk. Extensive conservative risk calculations show that, for a middle-aged person, radiotherapy will increase the risk of fatal cancer within the statistically expected life span by 0.02%–0.05% (e13, e14). For younger people (25 years) this risk must be doubled, for older people (over 60 years) it can be halved. For each individual patient, this risk needs to be explained and set against the burden of disease so that an informed decision can be made.

**Treatment algorithm, counseling, and decision-making**

As the evidence increases, designing a treatment algorithm has become easier. Every hand surgeon should be able to offer both, minimally invasive pro-

cedures such as PNF or CCH, if available, and more invasive procedures such as SF, LF, and DF, and to explain their advantages and disadvantages to the patient. It is essential to include the patient’s goals and wishes in the discussion and come to a joint decision.

Painful fibrosis without extension deficit can usually be treated by the wearing of padded, pressure-distributing fingerless gloves. Radiotherapy is also available to halt progression in these early stages.

In general, surgery should only be performed when contractures have developed that the patient experiences as impairing function. This can vary greatly from one person to another; for example, a patient’s occupation will have a strong influence on his or her ability or willingness to live with an extension deficit (e.g., pianist versus construction worker). Patients’ requirements for postoperative healing and use of their hand can vary just as much.

With contractures, minimally invasive treatment almost always leads to a good result with rapid recovery and return to everyday life without incurring high costs. Although the outcome of this treatment is not long-lasting, which is a disadvantage, the treatment can almost always be repeated with similar results.

Where primary contractures are severe (total extension deficit over 90° and isolated PIP contracture over 60°), minimally invasive treatments are less effective. For a patient who prefers a long-lasting result, or wants troublesome fibrosis removed in addition to contracture correction, and accepts a longer recovery time, LF (Figure 2) is preferable.

In young patients with a family history in which both parents are affected and in whom severe contractures and concomitant diseases such as diabetes mellitus are present, primary dermofasciectomy can be considered because early recurrence after PNF and even LF occurs more frequently in this group. However, the patient has to accept loss of sensitivity in the grafted areas.

Where multiple fingers are affected to varying degrees, different surgical techniques can be combined to achieve the patient's desired outcome without compromise in terms of complications (Figure 3). This "modular technique," – for example, combining SF and/or LF on some rays and PNF on others (Figure 3) – is becoming a valuable option for patients who want minimally invasive treatment with rapid recovery, even though they have advanced or recurrent disease. It is also useful in high-risk patients with diabetes, severe nicotine abuse, or on anticoagulant medication, which increase the risk of postoperative complications.

Predicting the natural course of the disease and the time interval from surgery to recurrence in the individual case remains difficult and should be an object of future studies, as should comparisons between the different surgical techniques. To allow this, it will be essential to establish a uniform definition of the multiple measurement methods and definitions (e15) of clinical improvement and recurrence used in the literature to date.

**Conflict of interest statement**

Prof. Hermann has received consultancy fees from Novo College/Novo Cure.

Prof. Werker has received consultancy fees from Fidia Ltd, Italy.

The other authors declare that they have no conflict of interest.

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[www.aerzteblatt-international.de/m2021.0325](http://www.aerzteblatt-international.de/m2021.0325)

**CLINICAL SNAPSHOT**



**Garré Disease With Club-Shaped Thickening of the Femur**

A 62-year-old female patient without underlying disease presented at the orthopedic surgery department with a 10-year history of mild pain in her left thigh. Standard potential diagnoses were ruled out as causes of her symptoms on the basis of her medical history. Laboratory tests revealed the erythrocyte sedimentation rate was significantly elevated to 90 mm/h (normal: <20mm/h). Anteroposterior X-ray of the left femur showed obliteration of the marrow cavity with widening of the cortex associated with increased bone density and significant periosteal reaction, creating the appearance of a “club-shaped femur”. Histological examination of the bony tissue confirmed the diagnosis of Garré’s sclerosing osteomyelitis. The patient was treated with analgesics and a watchful waiting approach. At the 3-year follow-up visit, she reported pain relief and no new symptoms.

Garré’s sclerosing osteomyelitis is a rare chronic inflammatory disorder, which is characterized by periosteal reactions, ossifying periostitis, and bone neoformation.

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## Supplementary material to:

## Dupuytren's Disease—Etiology and Treatment

by Mike Ruettermann, Robert Michael Hermann, Karl Khatib-Chahidi, and Paul M.N. Werker

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## eBOX

**Fascial anatomy of the hand and fingers**

In recent years, microanatomic dissections carried out because of discrepancies between previously known anatomical descriptions and intraoperative findings have shed light on the anatomy of the palm of the hand distal to the transverse ligament of the palmar aponeurosis (TLPA) (e16). These new findings are of clinical importance and must be taken into account when surgical treatment options are being considered.

It had long been assumed that the middle layer of pretendinous fibers (McGrouther layer 2) passes beneath the neurovascular bundle and the natory ligament (NL) to merge with the lateral digital sheet (LDS) in the proximal phalanx. However, microanatomic preparations revealed an anatomical structure that was named the "palmodigital spiral system" (PSS). The course followed by this structure as it spans the palmar and digital fibers is different from that previously described. Proximally, this PSS also fuses with fibers of the intrinsic muscle fasciae. All these proximal fibers insert on the dorsal aspect of the NL, so that the pretendinous layer 2 fibers actually course in a 360° spiral. The course of these fibers can result in a spiral course of the neurovascular bundle in this area, thus increasing the risk of intraoperative nerve injury. Because of the insertion of these fibers on the underside of the NL in this region the spiral course of the nerve begins proximal to the NL. The presence of fat between the skin and the cord is pathognomonic of displacement of the neurovascular bundle in this region (e17). If the fibers of the intrinsic muscle fasciae are also diseased and cause a contracture spanning the MCP joint, treatment by percutaneous needle fasciotomy (PNF) or collagenase becomes difficult since this cord cannot be reached without potentially damaging the neurovascular bundle.

Fibers originating from the proximal annular ligament form the middle part of the PSS. These fibers spiral up to 180° and course across the lateral digital sheet into the best developed part of Grayson's ligament, which covers the palmar aspect of the neurovascular bundle. They also fuse with Cleland's ligaments, which partly originate on the side of the tendon sheath (e18, e19). Because of these connections, pathological changes can result in the digital nerve coursing in a second spiral in the area of the proximal phalanx (e20).

Another clinically important finding is convergence of the proximal fibers of the PSS with those of the adjacent finger just distal to the bifurcation of the common digital artery. This explains why some cords appear to cross from one ray to the next, forming so-called Y-cords. Precise knowledge of this complex three-dimensional microanatomy of the structures involved in Dupuytren's disease is important for hand surgery.

Questions on the article in issue 46/2022:

## Dupuytren's Disease—Etiology and Treatment

cme plus+

The submission deadline is 18 November 2022. Only one answer is possible per question.

Please select the answer that is most appropriate.

### Question 1

What is the estimated worldwide prevalence of Dupuytren's disease?

- a) 2%
- b) 4%
- c) 6%
- d) 8%
- e) 10%

### Question 2

Genetic factors play a role in the etiology of Dupuytren's disease. What is the extent of the contribution of genetic factors to the development of this disease?

- a) 10%
- b) 20%
- c) 40%
- d) 60%
- e) 80%

### Question 3

Which of the following are possible findings in Tubiana stage 4 disease?

- a) Fibrosis without functional impairment
- b) Fibrosis and an extension deficit greater than 135°
- c) Palmar fibrosis without extension impairment
- d) No fibrosis and a mild extension deficit of 5°
- e) Fibrosis and an extension deficit of 25°

### Question 4

Which disease is associated with Dupuytren's disease?

- a) Hypertension
- b) *Helicobacter pylori* infection
- c) Diabetes mellitus
- d) Ankylosing spondylitis
- e) Hyperlipidemia

### Question 5

Which activity, if performed long-term, is a risk factor for developing Dupuytren's disease?

- a) Working with vibrating tools
- b) Spending time in cold-storage rooms
- c) Working in a damp environment
- d) Heavy lifting
- e) Skin contact with allergens

### Question 6

Which surgical procedure is regarded as the reference standard in the treatment of Dupuytren's disease?

- a) Limited fasciectomy
- b) Dermofasciectomy
- c) Percutaneous needle fasciectomy
- d) Radical fasciectomy
- e) Selective/segmental fasciectomy

### Question 7

What is a common complication after surgical treatment of Dupuytren's disease?

- a) Impaired circulation
- b) Stiffness
- c) Hyperesthesia
- d) Hyperalgesia
- e) Tremor

### Question 8

What is the cumulative complication rate after limited fasciectomy?

- a) 5%
- b) 9%
- c) 13%
- d) 17%
- e) 21%

### Question 9

Under certain conditions, radiotherapy may be given. For which stage of disease is there good evidence for this intervention?

- a) Stage 2 (Meyerding)
- b) Stage 3 (Meyerding)
- c) Stage 4 (Iselin)
- d) Stage 3 (Tubiana)
- e) Stage N (Tubiana)

### Question 10

Which of the following is a disadvantage of percutaneous needle fasciotomy?

- a) Longer recovery time
- b) Loss of sensibility over a greater area
- c) Higher recurrence rate
- d) Extensive scarring
- e) Extensive hematoma