A Comparison of the Direct Outcomes of Percutaneous Needle Fasciotomy and Limited Fasciectomy for Dupuytren’s Disease: A 6-Week Follow-Up Study

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**Purpose:** The demand for percutaneous needle fasciotomy (PNF) as treatment for Dupuytren’s disease is increasing because of its limited invasiveness, good outcome, limited number of complications, quick recovery, and overall patient satisfaction. This randomized controlled trial was designed to test whether these short-term expectations are sound by comparing this treatment with limited fasciectomy (LF) with regard to these aspects.

**Methods:** We treated 166 rays: 88 by PNF and 78 by LF. Total passive extension deficit (TPED) improvement at 1 week and at 6 weeks were the primary outcome parameters; patient satisfaction, hand-function recovery, and complication rate were secondary outcome parameters. We used the Disabilities of the Arm, Shoulder, and Hand questionnaire to measure disabilities of the upper extremity before and after treatment and all adverse effects and complications were recorded.

**Results:** Overall TPED improvement was best at 6 weeks. In the PNF group TPED improved by 63% versus 79% in the LF group; this difference was statistically significant. Results at the proximal interphalangeal joint were worse than those at the metacarpophalangeal and distal interphalangeal joints for both the PNF and LF groups. The rays classified before surgery as Tubiana stages I and II showed no difference between these treatments, but for rays higher than stage II LF clearly was superior to PNF as a treatment modality. The rate of major complications in the LF group was 5% versus 0% in the PNF group. Patient satisfaction was almost equal but direct hand function after treatment was considered better in the PNF group, as was the degree of discomfort that patients experienced. This was underscored by the Disabilities of the Arm, Shoulder, and Hand scores in the PNF group, which were significantly lower than those in the LF group at all time points measured.

**Conclusions:** In the short term and in cases with a TPED of 90° or less PNF is a good treatment alternative to LF for treatment of Dupuytren’s disease. (J Hand Surg 2006;31A:717–725. Copyright © 2006 by the American Society for Surgery of the Hand.)

**Type of study/level of evidence:** Therapeutic, Level I.

**Key words:** Complications, Dupuytren, needle fasciotomy, limited fasciectomy, outcome.

In 1614 Plater of Switzerland, in his book *Observationum in Hominis Affectibus*, described what later became known as Dupuytren’s contracture.¹ The first treatment for this disease was described by Cline² in 1777 and consisted of division of the pathologic cords. The first closed percutaneous fasciotomy was performed by Cooper, whose name this treatment bears (Cooper fasciotomy).¹ In subsequent centuries surgical treatment regimens for Dupuytren’s disease have undergone a complete pendulum movement. In 1834 Goyrand,³ helped by the emergence of anesthesia, performed a limited fasciectomy (LF). Gradually surgery became more aggressive, reaching a summit in the 1950s when total palmar fasciectomy...
was advised by McIndoe and Beare. This treatment was hampered by a very high complication rate and therefore surgeons returned to more selective fasciectomies or LFs. In the late 1970s a group of French rheumatologists reintroduced the Cooper fasciotomy and performed it using a fine (25-gauge) needle under local anesthesia, calling it percutaneous needle fasciotomy (PNF). Some hand surgeons have adopted this technique and favorable results have been reported.

Nevertheless the technique used most frequently by hand surgeons is LF. A drawback of this procedure is a cumulative complication rate of 19%. The most feared complication is transection of a nerve or artery, which is reported to occur in 3% of cases. Another disadvantage is the relatively long recovery period of 21 to 58 days.

In contrast most patients treated by PNF can use their hands optimally within 1 week; in addition complication rates of PNF have been reported to be lower than those of LF and the complications reported have been less serious. They consist mostly of skin tears, temporary swelling, mild hematomas, and superficial infections. A much feared major complication is the rupture of a flexor tendon, which is reported in 0.05% of cases. A reported disadvantage of PNF is the high recurrence rate of 58% after 3 years, whereas the recurrence rate of LF has been reported to be 41% after 5 years.

This study compares the short-term outcomes of PNF and LF in a randomized controlled setting. Total passive extension deficit (TPED) improvement at 1 week and 6 weeks were the primary outcome parameters and complications, patient satisfaction, and hand-function recovery were the secondary outcome parameters. (The TPED is the sum of the passive extension deficits [PEDs] of the metacarpophalangeal [MCP], proximal interphalangeal [PIP], and distal interphalangeal [DIP] joints.)

Materials and Methods

Study Design

This study was designed according to and approved by the Medisch Ethische Toetsings Commissie, the Dutch Medical Ethics Committee, in January 2002. Written informed consent was obtained from all patients.

Between August 2002 and January 2005 all patients with Dupuytren’s disease who visited the outpatient clinics of any of the 5 plastic surgeons and 4 residents from our Department of Plastic, Reconstructive, and Hand Surgery were considered for inclusion in this trial. Inclusion criteria were (1) a flexion contracture of at least 30° in the MCP, PIP, or DIP joints; (2) a clearly defined pathologic cord in the palmar fascia; and (3) willingness to participate in this trial.

Excluded from the study were (1) patients with postsurgical recurrence or extension of the disease, (2) patients who were not allowed to stop taking their anticoagulants, (3) patients generally unfit to have surgery, and (4) patients who were not willing to participate in this study or had a specific treatment wish.

Study candidates were referred subsequently to 1 of the 2 surgeons from our department who performed this study (H.T.L. or P.M.N.W.). Patients were counseled about our study and a complete history and physical examination of both hands was performed after written informed consent had been obtained.

During the examination the amount of PED of the MCP, PIP, and DIP joints was quantified in degrees and translated into TPED and into the Tubiana classification (Table 1).

The flexion deficit was recorded by measuring the distance from the distal palm crease to the pulps of the fingers while making a fist. Sensibility was tested using Semmes-Weinstein monofilaments. Furthermore the presence of knuckle pads; the presence or absence of fatty tissue between the cord and the skin distal to the distal palmar crease, indicating that the digital nerve possibly was relocated by a spiral cord; and the presence or absence of plantar or penile involvement were recorded.

Randomization

A power analysis performed beforehand based on the number of complications resulting from both treatments as previously reported dictated the inclusion of approximately 120 hands.

Patients were asked to pull a numbered envelope out of a box that had been prepared at the start of the study and that contained a note reading either “Limited Fasciectomy” or “Percutaneous Needle Fas-

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total Passive Extension Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0°–45°</td>
</tr>
<tr>
<td>II</td>
<td>45°–90°</td>
</tr>
<tr>
<td>III</td>
<td>90°–135°</td>
</tr>
<tr>
<td>IV</td>
<td>≥135°</td>
</tr>
</tbody>
</table>
ciotomy.” This determined which treatment each patient would receive. Patients who participated in this study were treated within 1 month after inclusion.

Questionnaires
Patients were asked to fill out a questionnaire about their health status and demographics and the Dutch translation of the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire. The DASH questionnaire is a validated instrument used to score disabilities of the upper extremity during daily activities. This questionnaire consists of 30 items that address disability and symptoms of the upper extremity on a scale from 0 to 5. The scores are added and transformed into a 100-point scale. The lower the score, the less disability is experienced. The scores were completed by all patients before surgery and 1, 2, 3, 4, and 5 weeks after treatment.

Surgical Technique
All treatments were performed by the surgeons named previously in random order (H.T.L. and P.M.N.W.).

Percutaneous needle fasciotomy was performed in an outpatient treatment room in the same way as performed by Lermusiaux and Tyssedou, the French rheumatologists who were visited by the senior author (P.M.N.W.) before the commencement of the study. PNF was performed in the same fashion as in a previously conducted pilot study.

Patients who were allowed to interrupt the use of anticoagulants according to the guidelines given by the prescriber were asked to stop this medication. We did not determine the level of anticoagulation.

For anesthesia we used 1% lidocaine and 1:100,000 epinephrine. The cord responsible for the flexion contracture was sectioned at as many levels as possible in the palm and fingers, depending on the extent and location of the disease, with a 25-gauge needle mounted on a syringe. If fatty tissue was present between the cord and the skin fasciotomy in the distal part of the palm was performed with extra care taken to avoid a potential spiral nerve. After division of the cord the affected finger was extended passively to pull the ends of the sectioned cord apart and to obtain maximal release of the contractures. A small dressing was applied thereafter for 24 hours. Patients were encouraged to start practicing flexion and extension of the fingers immediately after treatment. No formal hand therapy was initiated.

Limited fasciectomy was performed in the surgical theater. Either regional anesthesia or general anesthesia was used according to the anesthesiologist’s and patient’s preferences. A tourniquet was used in all cases.

In the palm a transverse incision was performed with a longitudinal proximal extension over the cords and a distal extension toward the second and fourth web spaces as described by Skoog. In the digits a Bruner-type incision was used. After mobilization of the skin flaps all pathologic cords were excised under loupe magnification. In the palm the transverse palmar ligament was left intact. Care was taken to try to preserve all digital nerves and arteries. Adversely inflicted damage to these structures was repaired with standard microsurgical techniques. The skin was closed after transposition as necessary. In case there was a shortage of skin in the palm the transverse incision was left open. A light compressive bandage was applied and left in place for 1 week. Patients were encouraged to start practicing flexion and extension of the fingers immediately after surgery, as soon as anesthesia had resolved. Hand therapy was not standard but was used only as needed. The stitches were removed after a minimum of 10 days.

Follow-Up
Patients were seen at the outpatient clinic 1 week and 6 weeks after treatment. During these visits the same measurements taken before surgery were taken by the surgeon using a checklist. In addition the complications of both treatments were noted.

We defined minor and major complications. Minor complications were skin fissure (small tears that sometimes occur at the site of skin penetration during PNF once a cord has been divided and the treated digit is extended) and paresthesias (tingling sensations at any part of the treated digit without objective disturbance of sensation at the tip of the digit). Major complications included infection, skin slough, hematoma, transected artery, suspected digital nerve injury, re-exploration, and suspected division of a flexor tendon.

To compare the complication rates we used these rates of minor and major complications.

We also recorded whether full flexion of the treated digits was possible at 6 weeks. Flexion was defined as reduced if a flexion deficit of 1.5 cm from the pulps to the distal palmar crease persisted.

At 1, 2, 3, 4, and 5 weeks patients were asked to fill out the DASH questionnaire. After 6 weeks patients were asked to fill out a questionnaire about treatment satisfaction. They had to give marks ranging from 0 (no/very negative) to 10 (yes/very positive).
Demographics
A total of 125 hands (121 patients) were included; 4 patients participated with both hands at separate times. From those 125 hands 2 sets of data were incomplete and 6 patients (6 hands) withdrew from the study before treatment took place. This resulted in a complete data set for 113 patients (117 hands), on whom 166 rays were treated. Eighty-eight rays were treated by PNF; 78 rays were treated by LF. In the PNF group 83 rays were affected at the MCP joint, 57 at the PIP joint, and 10 at the DIP joint. In the LF group these figures were 72, 49, and 6, respectively.

Six weeks after treatment 1 patient had died of a non–treatment-related cause and 1 set of data was lost, so there were 111 patients (115 hands) remaining.

Eighty-three percent of the patients were men. The mean age was 63 years (range, 35–86 y). Most of our patients were Dutch; only 2 patients were from another country within northern Europe. Forty-three percent of our patients reported a positive family history for Dupuytren’s disease.

The average time between acquiring the disease and the first visit to our clinic varied from 1 year to more than 20 years (average, 7 y).

Seventy percent of patients had been manual laborers during their professional lives; 41 of these had been working with their hands for more than 30 years. Thirty-four of our patients had never performed heavy labor. Fifty-nine patients stated that they used their hands intensively during their hobbies.

The groups were equal regarding the reported comorbidity, alcohol use, and other demographics (Table 2). The treated sides and rays were distributed equally over both groups.

Statistical Analysis
Statistical evaluation was performed using statistical software (SPSS software; SPSS Inc., Chicago, IL). The characteristics of both patient groups and the characteristics of the hands and digits were analyzed with cross tables.

Categoric data were analyzed with the chi-square test. If cells contained a number less than 5 we used the Fisher exact test. The rest of the data were analyzed using the Student t test. Because the data from the questionnaire were too skewed to use a t test we used a Mann-Whitney U test for analysis.

We used a t test to analyze the DASH questionnaire results. If less then 90% of the questionnaire was filled in—that is, if more than 3 of the questions were missing—by definition the score was invalid. Data for patients who did not fill out the preoperative form or more than 1 of the following questionnaires at 1, 2, 3, 4, or 5 weeks were not used in the statistical analysis.

Significance was set at a p value of less than .05.

Results
Primary Outcome Parameters
Percutaneous needle fasciotomy. The average TPED before treatment measured 66° per ray in the PNF group. The largest contractures were found at the MCP joint: 44° on average. The contractures at the PIP and DIP joints were 34° and 16°, respectively.

One week after PNF the mean TPED per ray was 30°, a 58% reduction from the preoperative TPED. This was a statistically significant reduction of the contracture (p = .001). The results at the separate joints differed, however. The best results were found at the MCP joint with a 67% reduction of PED; 17° of PED remained. The reduction of PED at the PIP joint was 34% (24° remained) and at the DIP joint was 56% (8° remained).

Five weeks later the results were better than 1 week after treatment: the overall reduction of TPED
measured 63%. The results at the MCP joint still were best, with a TPED reduction of 75%, followed by a 61% reduction at the DIP joint and a 33% reduction at the PIP joint (Table 3).

Limited fasciectomy. Before surgery mean TPED in the LF group was 62°, and again the largest contractures were found at the MCP joint (mean, 42°). The contractures at the PIP and DIP joints measured 34° and 28°, respectively.

After 1 week the mean TPED was 15°, a reduction of 73% (p < .001). Here the largest reduction in TPED was found at the DIP joint: 6 joints were treated and none had any extension deficit left. At the MCP joint an average reduction of 83% was obtained (a TPED of 9° remained) and at the PIP joint the average reduction was 53% (a TPED of 14° remained).

Six weeks after treatment the TPED had improved further, with an average reduction of 79%. This was caused mainly by a further reduction of the contracture at the MCP joint, which averaged 5°—a TPED reduction of 87%. The results at the DIP and PIP joints worsened a little: the DIP reduction measured 83% and the PIP reduction measured 49% (Table 3).

Percutaneous needle fasciotomy versus limited fasciectomy. The preoperative TPED of the 2 groups did not differ significantly: 66° (SD, 36°) per ray in the PNF group versus 62° (SD, 36°) per ray in the LF group (p = .549). The Tubiana score also was equal in the 2 groups (p = .226).

Limited fasciectomy resulted in a statistically significant greater reduction of the flexion contractures compared with PNF (after 1 week, p = .002; after 6 weeks, p = .001).

The results at the MCP joint differed statistically after both 1 and 6 weeks (Table 3). The results at the PIP joint differed significantly after 1 week and in favor of LF but after 6 weeks this significance has disappeared. Results at the DIP joint did not differ significantly.

When we analyzed the data using the Tubiana classification it appeared that PNF and LF have a comparable outcome if the finger is graded as Tubiana I. The higher the Tubiana stage, however, the more limited the effect of PNF, especially if the finger was staged as Tubiana III or Tubiana IV (Tables 1 and 4).

Secondary Outcome Parameters
Complications. Table 5 shows the relevant complication rates of the 2 groups. In the PNF group 33 minor complications were recorded; these consisted of 29 skin fissures and 4 cases of paresthesia. No major complications occurred.

In the LF group we noted 13 minor complications (all cases of paresthesia) and 3 major complications: infection, hematoma, and digital nerve injury. The digital nerve injury was inflicted in a hand in which the transverse palmar fibers had been divided unintentionally. During excision of the pathologic cord the nerve was lifted out of its bed and this was not noted.

### Table 3. The Reduction of Passive Extension Deficit 1 Week and 6 Weeks After Treatment

<table>
<thead>
<tr>
<th>PED</th>
<th>1 Week</th>
<th>6 Weeks</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PNF Group</td>
<td>LF Group</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n = 88 rays)</td>
<td>(n = 78 rays)</td>
<td></td>
</tr>
<tr>
<td>MCP</td>
<td>67 ± 31</td>
<td>83 ± 28</td>
<td></td>
</tr>
<tr>
<td>PIP</td>
<td>34 ± 40</td>
<td>53 ± 44</td>
<td></td>
</tr>
<tr>
<td>DIP</td>
<td>55 ± 58</td>
<td>100 ± 0</td>
<td></td>
</tr>
<tr>
<td>TPED</td>
<td>58 ± 35</td>
<td>73 ± 39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>75 ± 26</td>
<td>87 ± 22</td>
<td>.003</td>
</tr>
<tr>
<td></td>
<td>33 ± 42</td>
<td>49 ± 46</td>
<td>.062</td>
</tr>
<tr>
<td></td>
<td>61 ± 59</td>
<td>83 ± 40</td>
<td>.441</td>
</tr>
<tr>
<td></td>
<td>62 ± 32</td>
<td>79 ± 25</td>
<td>.001</td>
</tr>
</tbody>
</table>

NOTE: Values are reported as percentages (mean ± SD) of original contracture.

*Student t test at 6 weeks.

### Table 4. Reduction of TPED as a Percentage of the Preoperative Value After Percutaneous Needle Fasciotomy Versus Limited Fasciectomy by Tubiana Grade at 6 Weeks

<table>
<thead>
<tr>
<th>Tubiana Grade</th>
<th>PNF Group</th>
<th>LF Group</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (PNF, n = 28; LF, n = 29)</td>
<td>71 ± 45</td>
<td>82 ± 33</td>
<td>.329</td>
</tr>
<tr>
<td>II (PNF, n = 38; LF, n = 32)</td>
<td>67 ± 26</td>
<td>78 ± 22</td>
<td>.071</td>
</tr>
<tr>
<td>III (PNF, n = 16; LF, n = 11)</td>
<td>46 ± 15</td>
<td>75 ± 17</td>
<td>.000</td>
</tr>
<tr>
<td>IV (PNF, n = 6; LF, n = 4)</td>
<td>47 ± 8</td>
<td>79 ± 27</td>
<td>.004</td>
</tr>
</tbody>
</table>

NOTE: Values are reported as mean percentage ± SD.

*Student t test.
The overall cumulative complication rate therefore was 50% in the PNF group and 30% in the LF group. If we look at the major complications the cumulative complication rate in the PNF group was 0% and in the LF group it was 5%.

Besides those complications at 1 week after treatment there were 7 patients in the PNF group and 45 patients in the LF group with a flexion deficit of 0.5 cm or more. In none of these cases, however, was this caused by a flexor tendon division. After 6 weeks there were no patients in the PNF group with flexion deficits and in the LF group there were 19 patients with flexion deficits (mean, 0.6 cm). Two patients still had flexion deficits of more than 1.5 cm. Those patients did not have flexion deficits before surgery.

If a patient’s hand function did not improve as fast as expected he/she received physiotherapy. This was true for 6 patients in the PNF group and 8 patients in the LF group.

Patient satisfaction. Patients treated with PNF were more satisfied with the function of the hand at 6 weeks than those treated by LF (p = .003). Limited fasciectomy gave patients significantly more discomfort (p = .002). When asked if they would choose the same treatment again in the future both groups answered that they would do so.

Disabilities of the arm, shoulder, and hand questionnaire. A total of 114 patients filled out DASH questionnaires; however, only 50 patients from the PNF group and 47 patients from the LF group filled out the questionnaires to such an extent that they could be processed and analyzed statistically.

Before surgery DASH scores did not differ statistically between groups: 16 (SD, 14) in the PNF group and 14 (SD, 12) in the LF group (p = .584). One week after treatment the mean DASH score in the PNF group had increased to a level of 19—which was not significantly higher than the preoperative level—and decreased to 12 after 2 weeks. This reduction continued, with a mean score of 9 after 5 weeks of treatment.

In the LF group the DASH score measured 49 after 1 week and did not return to the preoperative level until after 5 weeks (score, 16).

The DASH scores of both groups differed significantly at all time points after treatment, with a p value of .000 at 1, 2, 3, and 4 weeks and a p value of .017 at 5 weeks.

**Discussion**

This study is the first part of a long-term study that will follow up patients with Dupuytren’s disease for 5 years after treatment with either PNF or LF. This article addresses specifically the outcome of PNF and LF in the first 6 weeks after treatment. This first part is important because it specifically investigates the postulated benefits of PNF such as minimal invasiveness, quick functional recovery, equal outcome, patient satisfaction, and limited number of complications in a randomized controlled fashion. The second part is a long-term study and will focus on recurrence rate.

For this purpose patients were randomized into 2 groups with an equal distribution of Tubiana degree, TPED, and demographics by means of pulling a random envelope out of a box. The demographics and contractures were similar to those described in previous studies.¹⁵ We performed LF on 57 hands and PNF on 60 hands. Patients were treated only

<table>
<thead>
<tr>
<th>Complication</th>
<th>PNF Group (n = 60 Hands)</th>
<th>LF Group (n = 57 Hands)</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection requiring antibiotics</td>
<td>0</td>
<td>1</td>
<td>.487†</td>
</tr>
<tr>
<td>Hematoma needing treatment</td>
<td>0</td>
<td>1</td>
<td>.487†</td>
</tr>
<tr>
<td>Skin slough</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Skin fissure</td>
<td>29</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Sympathetic dystrophy</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Paresthesia</td>
<td>4</td>
<td>13</td>
<td>.013</td>
</tr>
<tr>
<td>Changed Semmes-Weinstein monofilament</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Digital nerve injury requiring repair</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Revision surgery in surgical theater</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Flexor tendon division</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

NA, not applicable.
*Chi square test.
†Fisher’s exact test.

¹⁵ We performed LF on 57 hands and PNF on 60 hands. Patients were treated only
once in the PNF group or the LF group. We calculated a cumulative complication rate as previously performed by McFarlane and McGrouther.\(^7\)

Some technical points about PNF have to be made to prevent damage to nerves. Only a very limited amount of local anesthesia (0.1–0.2 mL) should be administered at the selected puncture site. The pathologic cord itself is insensible but the nerve is not if it is not numbed. If the nerve is approached too closely the patient will report a strong electric-current sensation at the tip of the treated digit. The patient should be asked to report this immediately and the needle should be redirected in such an instance. One might wonder if a spiral cord presents greater risk during treatment. This is not the case because the course of the displaced nerve is quite standard: it lies relatively superficial at the junction of the palm and the base of the finger. This location should be avoided during treatment. In addition, because the spiral bands course deep to the neurovascular bundles after leaving the central band and because the neurovascular bundles are embedded in subcutaneous fat at that location, the presence of fat between the skin and the pathologic cord near the web should raise a high level of suspicion for a nerve displaced by a spiral cord, and it would not be logical to perform PNF at that location; the cord lies relatively deep. These are the main reasons why spiral nerves are not damaged often if the procedure is performed correctly.

The hands of the LF group were bandaged for 1 week whereas the hands treated by PNF were unwrapped after 24 hours. This may have caused some bias in the results of hand function after 1 week. In addition hand therapy was not standard in all cases and was initiated only if the return of hand function was delayed. This regimen may have caused a higher rate of reduced flexion in both groups.

We used DASH questionnaires to score disabilities of the upper extremity. The Dutch translation of the DASH questionnaire has been proven to be a reliable and valid instrument for assessing upper-extremity disabilities.\(^\text{16}\) The preoperative DASH scores were equal to previously reported normative data from the United States.\(^\text{15}\)

The results of this study concerning short-term outcome suggest that overall LF is superior to PNF, especially when the Tubiana degree is III or IV. Results at the DIP joint were not statistically different because numbers were small (10 in the PNF group vs 6 in the LF group). At the PIP joint the difference between LF and PNF was almost statistically different. Complication rates of LF were higher than those of PNF.

Patients were satisfied equally with LF and PNF but patients treated by PNF reported a better direct function of the hand and less discomfort after treatment. This was substantiated by the DASH scores, which were significantly lower in the PNF group, indicating that patients were less disabled after PNF than after LF in the first 5 weeks after treatment. This was exactly what we had expected beforehand.

Percutaneous Needle Fasciotomy

Badois et al,\(^\text{10}\) the French rheumatologists who reintroduced PNF, performed PNF in 138 patients and found that 81% had good or excellent primary results, with a Tubiana score of 1 or less. In the group of patients with stage IV disease 48% had good results. Duthie and Chesney\(^\text{17}\) performed percutaneous fasciotomy on 82 patients. They reported an overall improvement rate of 69%. In 1997 Bleton et al\(^\text{11}\) performed a prospective study on 59 patients. Sixty-one percent of the patients had good results, with an improvement of more than 50%. Foucher et al\(^\text{6,18}\) reported an immediate improvement of 72% in 1998 and 76% in 2001.

Our results are not as good as those described in previous studies. With a mean improvement of 38° or 63%, there is a discrepancy. At first thought this might have been caused by our inexperience. Before we started this study, however, we performed a pilot study in which 51 patients with a mean contracture of 61° were treated by PNF. Together we treated 74 rays and the mean overall improvement was 76%. This outcome is comparable with the outcomes of the studies described earlier. The discrepancy suggests that PNF is not suitable for just any patient, but that when selected carefully part of the population of patients with Dupuytren’s disease could benefit very well from this minimally invasive treatment.

Another reason for the disappointing results could be that Badois et al\(^\text{10}\) performed PNF at a mean of 2 to 3 sessions. We performed only 1 session on each patient.

A third reason for the difference in outcome is probably the selection criteria; Foucher et al\(^\text{6}\) did not treat young patients or patients with skin involvement and used PNF at an earlier stage than they would have performed surgery.

The primary results of PNF in our study were quite reasonable concerning Tubiana stages I and II, but in stages III and IV we had improvement rates of only...
46% and 47%. The results of our hands show that PNF is not suitable for the more serious contractures, as also had been concluded previously by Foucher et al.6

Limited Fasciectomy
In the literature the results after LF vary from 53% in severe contractures (Weinzweig et al19) to 65% (Denkler20) and 76% (Hoet et al21). In this study the mean reduction of TPED was 79%.

A comparison of our results from PNF and LF show that only in stages I and II are the results of these treatments equal.

Complications
Regarding complication rates in the literature our results from PNF are comparable with those reported by Foucher et al.6 Badois et al.10 and Bleton.11 Four patients reported paresthesia, but when we used the Semmes-Weinstein needles the sensibility had not diminished, suggesting that this was caused by neuropraxia. This neuropraxia was probably the result of nerve stretching during the procedure.

McFarlane and McGrouther7 in 1990 reported a cumulative complication rate of 19% for LF. In our series we report a complication rate of 30%. This is caused mainly by a high rate of paresthesia. Of the 13 patients responsible for this rate only 1 had an objectively diminished sensibility using Semmes-Weinstein monofilaments. We expect that all other cases of paresthesia will resolve in time.

As for reduced flexion the flexion deficit was small: in 17 of 19 patients the distance between the pulp and the distal palm crease was 1 cm or less. Many patients were not using the hand after 6 weeks as much as they had before surgery; this could be attributable to stiffness and discomfort at the level of the scar. We do not expect that this loss of flexion is permanent in all these patients and we will follow up the patients and report on this.

Patient Satisfaction and DASH Scores
Patient satisfaction in the PNF and LF groups was almost equal. Although the outcome of PNF is significantly worse than that of LF patients apparently appreciate the fact that there is an immediate improvement of hand function and that they experience little discomfort.

The DASH scores exemplify this remarkable difference in disability of the upper extremity. After 5 weeks the differences between LF and PNF still are significant. We expect, however, that the scores in the LF group will continue to decrease over time and end at the same level as those of the PNF group. We will report on this in the future.

Overall PNF is less effective than LF as a treatment for Dupuytren’s disease, especially in cases with moderate to severe contractures. The difference is especially true at the MCP level. At the PIP joint the difference is borderline significant and at the DIP joint no difference in short-term outcome was found. The complication rate of PNF is low, however, and patients do not have to be admitted to the hospital. Finally, patients recover more quickly from PNF than from LF. Therefore PNF is useful to treat patients with Tubiana grade I and II disease to whom quick recovery is important. Careful selection of patients helps to get maximum results from treatment with PNF.

A long-term extension of this randomized clinical trial that will address a number of unanswered questions about PNF versus LF, especially regarding the chance of recurrence, is currently underway in our center.

References


