

Painful Nodules and Cords in Dupuytren Disease

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Purpose The etiology of Dupuytren disease is unclear. Pain is seldom described in the literature. Patients are more often disturbed by impaired extension of the fingers. We recently treated a series of patients who had had painful nodules for more than 1 year, and we therefore decided to investigate them for a possible anatomical correlate.

Methods Biopsies were taken during surgery from patients with Dupuytren disease and stained to enable detection of neuronal tissue.

Results We treated 17 fingers in 10 patients. Intraoperatively, 10 showed tiny nerve branches passing into or crossing the fibrous bands or nodules. Of 13 biopsies, 6 showed nerve fibers embedded in fibrous tissue, 3 showed perineural or intraneural fibrosis or both, and 3 showed true neuromas. Enlarged Pacinian corpuscles were isolated from 1 sample. All patients were pain free after surgery.

Conclusions Although Dupuytren disease is generally considered painless, we treated a series of early stage patients with painful disease. Intraoperative inspection and histological examination of tissue samples showed that nerve tissue was involved in all cases. The pain might have been due to local nerve compression by the fibromatosis or the Dupuytren disease itself. We, therefore, suggest that the indication for surgery in Dupuytren disease be extended to painful nodules for more than 1 year, even in the early stages of the disease in the absence of functional deficits, with assessment of tissue samples for histological changes in nerves. (*J Hand Surg* 2012;37A:1313–1318. Copyright © 2012 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic II.

Key words Dupuytren disease, nodules, pain, surgery.

PALMAR FASCIITIS AND CONTRACTURE was described by Plater¹ in Switzerland in 1614. Almost 200 years later, Dupuytren² published his first case of palmar contracture in 1831. More than 150 years later, the etiology of this disease is still unclear. A dysfunction of the fibroblasts is presumed, especially within the nodules.³ In the early phase of the disease, patients

present with nodules and Hueston pits in the palm of the hand. Later it can extend to a cord in the finger, and those affected contract in flexion, most often the ring and little finger. Patients usually find the impaired extensibility of the fingers disturbing. Other symptoms have rarely been reported, and especially pain has been described as rare.⁴

During our everyday clinical activity, we have observed a number of patients with painful nodules or cords in the different stages of the disease. The aim of this study was to find a possible anatomical cause for these painful nodules and cords.

MATERIALS AND METHODS

Between May 2008 and August 2009, 10 patients had surgery for painful Dupuytren disease in our department (Table 1). The mean age of the 4 women and 6 men was 63 years (range, 50–78 y).

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TABLE 1. Demographics

No.	Sex	Age (y)	Duration of Pain	Preoperative Pain Intensity (Visual Analog Scale)	Preoperative Clinical Findings	Surgery Indication	Intraoperative Findings—Surgical Procedure	Complications	Biopsy Findings	Postoperative Pain Intensity (Visual Analog Scale)
1	F	78	> 1 y	4	Cords from palm to PIP, ring and little fingers (stage 2). Nodule, palm, middle finger	Pain	Nerve fiber in cord palm, little finger. Cords and nodule removed		Nerve fibers in fibromatosis	0
2	F	70	> 1 y	7	Cord from palm to MCP, ring finger (stage 2)	Pain	Nerve fiber in cord palm, ring finger. Cord removed		Nerve fibers with perineural and intraneural fibrosis; neuroma	0
3	M	64	3 y	4	Cord from palm to PIP, ring finger (stage 3)	Pain	Nerve fiber in cord palm, ring finger. Cord removed		Nerve fibers in fibrous tissue	0
4	F	54	1 y	6	Nodule, palm, ring finger (stage 1); no trigger	Pain	Three nerve fibers in nodule, palm, ring finger. Broad nodule removed, ring finger, with release of stenosis of ring band A1		Nerve fibers in fibromatosis with perineural fibrosis	0
5	M	74	3 y	4	Cord from palm to DIP, little finger; nodules, palm, ring and little fingers (stage 2)	Pain and restricted extension	Nerve fiber cord, little finger; tenosynovialitis palm, middle finger. Nodules and cords removed; tenosynovectomy, palm, middle finger		Nerve fibers in fibrous tissue; Pacini bodies	0
6	M	50	> 1 y	6	Nodules, palm, thumb and ring finger (stage 1)	Pain	Nerve fiber cord, thumb and ring finger. Nodules removed, with release of stenosis ring band A1, ring finger		Neuroma in nodule, thumb; Meissner corpuscle in nodules, thumb and ring fingers	0
7	M	68	2 y	3	Cords from palm to PIP, ring and little fingers (stage 3)	Pain and restricted extension	Nerve fibers in cord. Cord removed			0
8	M	61	3 y	3	Cord from palm to DIP, little finger (stage 4)	Pain and restricted extension	Nerve fiber in cord. Cord removed		Neuroma in cord	0
9	F	51	4 y	7	Cord from palm to PIP, ring and little fingers (stage 3)	Pain and restricted extension	Nerve fiber in cord. Cord removed; partial tenosynovectomy	CRPS	Nerve fibers in fibrous tissue	0
10	M	59	> 1 y	5	Cord from palm to PIP, ring finger; nodule, palm, middle finger (stage 3)	Pain and restricted extension	Nerve fibers in nodule. Cord and nodule removed	CRPS	Nerve fibers with intraneural and perineural fibrosis	0

DIP, distal interphalangeal joint; MCP, metacarpophalangeal joint; PIP, proximal interphalangeal joint.

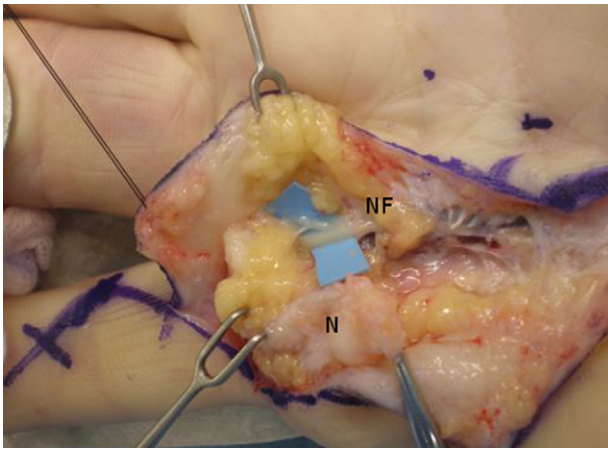


FIGURE 1: Nerve fiber (NF) beneath a laterally retracted nodule (N). Digital nerve was identified deep to what is seen in this image.

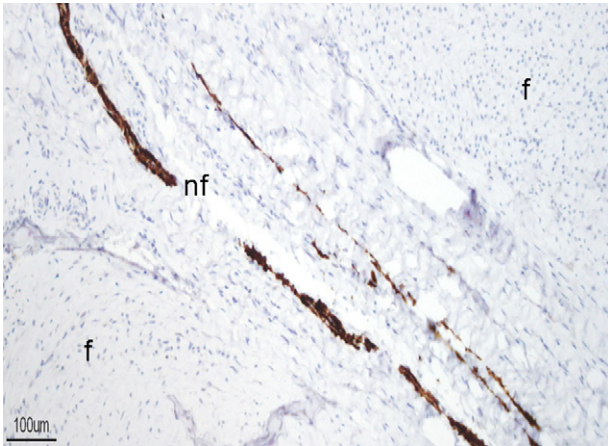


FIGURE 2: Nerve fascicle (nf) embedded in fibrous tissue (f) (S-100 immunoreaction).

All were right-handed. Five patients had contracture or nodules on the right side, and the 5 others had them on the left. Indication for surgery was persistent pain of at least 3 on a visual analog scale (0, no pain; 10, worst pain) for more than 1 year alone in 5 cases and with extension deficits in the remaining 5. The Dupuytren contracture was staged according to the classification of Iselin and Dieckmann⁵: stage 1, nodules or cords without contraction; stage 2, metacarpophalangeal joint contraction; stage 3, metacarpophalangeal and proximal interphalangeal joint contraction; stage 4, same as stage III with hyperextension of the distal interphalangeal joint. Pain was evaluated before surgery on a visual analog scale. The type of pain was also recorded. Intraoperatively, special attention was paid to the digital and cutaneous nerve branches during dissection of the cords or nodules.

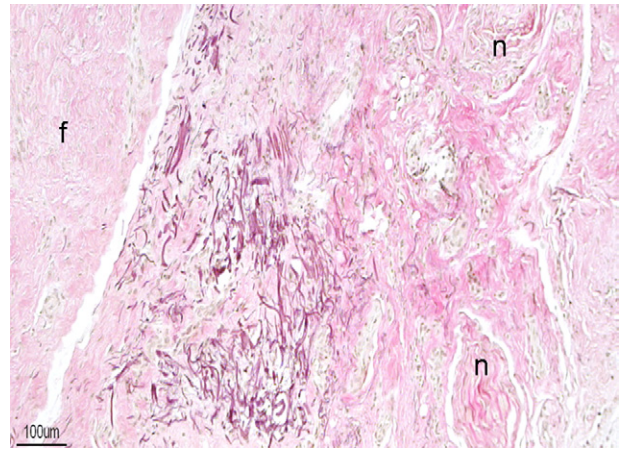


FIGURE 3: Fibromatosis (f) with neuroma (n) composed of small proliferative nerve fascicles enveloped in collagen (van Gieson staining).

The 13 biopsies taken during surgery were stained with hematoxylin-eosin, and S-100 immunohistochemistry was performed to detect neuronal tissue.

At the last follow-up (mean, 25 mo after surgery; range, 12 to 31 mo), pain was again evaluated using the visual analog scale. All postoperative complications were recorded.

RESULTS

Our 10 patients had 17 fingers affected by Dupuytren contracture. The staging of the contractures is given in Table 1. None of the patients had been treated surgically for Dupuytren contracture before. The mean preoperative pain intensity on our visual analog scale was 4.9 (range, 3 to 7). The type of pain was described as searing (4), burning (2), prickling (2), or dull (2), mostly on direct pressure or by stretching the diseased finger. The patients had had symptoms for a mean of 3.7 years (range, 1–10 y).

Cords and nodules were removed from all patients. Trigger finger release and flexor tendon synovectomy were also performed in 2 cases each.

Nerve branches passing into or crossing the cords or nodules were seen in all cases (Fig. 1).

Of the 13 biopsies taken, 6 showed nerve fibers embedded in fibrous tissue (fibromatosis) (Fig. 2), and 3 showed perineural or intraneural fibrosis, or both. True neuromas (Figs. 3, 4) were found in 3 cases.⁶ Enlarged Pacinian corpuscles, as a sign of a possible Pacinian neuroma, (Fig. 5) were found in a further case.^{7–9} Meissner corpuscles were isolated in the final case.

All patients were pain free at the last follow-up, 25 months (range, 12 to 31 mo) after surgery. There was

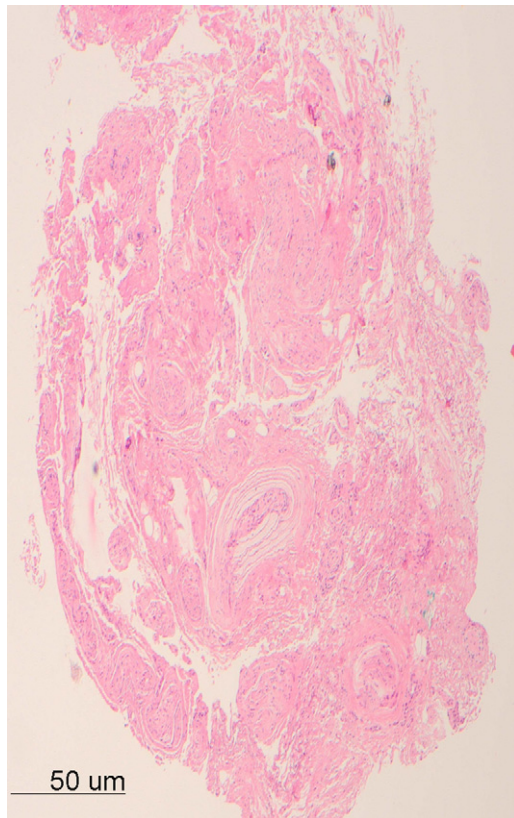


FIGURE 4: Neuroma (hematoxylin-eosin staining).

no recurrence. Two patients had complications. One developed complex regional pain syndrome (CRPS) and was treated with physiotherapy and calcitonin salmonis nasal spray (Miacalcin, Novartis Pharma, Switzerland), leading to full functional recovery of the operated hand. The second patient developed a hypertrophic scar and persistent swelling of the ring finger with incomplete extension and probable CRPS after resection of a palmar nodule in the middle finger and a cord in the ring finger. He was treated with occupational therapy, extension splints, local silicone applications, and oral steroids. He finally had a loss of extension of 60° of the proximal interphalangeal joint of the ring finger and 50° of the proximal interphalangeal joint of the small finger. Proximal interphalangeal joint arthrolysis is planned.

DISCUSSION

We treated 10 patients with Dupuytren disease in different stages. All reported pain of different types in the region of the nodules or cords, whether a contracture was present or not. Pain is rarely reported in Dupuytren disease.⁴ Single nodules without finger contraction are not considered an indication for surgery. Over the past few years, however, we have seen 10 patients with

painful Dupuytren disease of more than 1 year duration who asked for surgery because of the pain. None had had hand surgery before.

To establish whether there is a correlation between pain and anatomical changes, we examined the nodules or cords during surgery and noted tiny nerve fibers passing through them in all cases. We took biopsies and asked our pathologists to look specifically for nerve fibers. Nerve fibers embedded in the dense fibrous tissue of Dupuytren disease, as found in 6 of our cases, have already been described in the literature.¹⁰ On histological examination, 7 of our biopsies showed changes in microstructure. Neuromas were found in 3 cases, and 3 other cases showed intraneural or perineural fibrosis involving a pathological process affecting nerve fibers. These findings might be a consequence of local nerve compression by the fibromatosis. Because fibrous tissue is inelastic, persistent compression of a nerve might be followed by a decrease in axonal transport and perfusion of the nerve, ultimately leading to fibrosis of the nerve or development of pseudoneuroma.^{11–13} It is also possible that Dupuytren disease itself might cause local growth factors to be released¹⁴ and result in morphological changes in nerve fibers. Pain might, therefore, be the consequence of compression of altered nerve fibers in this inelastic environment.^{10,15}

Dupuytren disease is also related to inflammation and has been associated with sprouting of substance P positive nerve fibers,¹⁶ which are one of the origins of pain in Achilles tendinosis.¹⁷ This pathophysiological mechanism might also explain pain in the early stages of Dupuytren disease. Two of our cases developed CRPS after surgery. This is found in 5% to 40% of cases after fasciectomy for Dupuytren disease.¹⁸ Tissue trauma, as occurs in fasciectomy, amplifies cytokine signaling. Cytokines can excite nociceptors and enhance the release of neuropeptides such as substance P, resulting in neurogenic inflammation. Levels of substance P were higher in patients with CRPS.¹⁹ This process might have occurred in our 2 patients with CRPS.

Enlarged Pacinian corpuscles (hyperplasia) are found in Dupuytren disease.^{8,9,20} One of our cases had enlarged Pacinian corpuscles and an increased density of these corpuscles. The increase in density and enlargement of Pacinian corpuscles might be linked to local release of growth factors,¹⁴ as the capsules of the Pacinian corpuscles were strongly positive for nerve growth factor receptor.²⁰ Such enlarged Pacinian corpuscles can be present in patients with no pain²¹ but can also cause pain.⁷

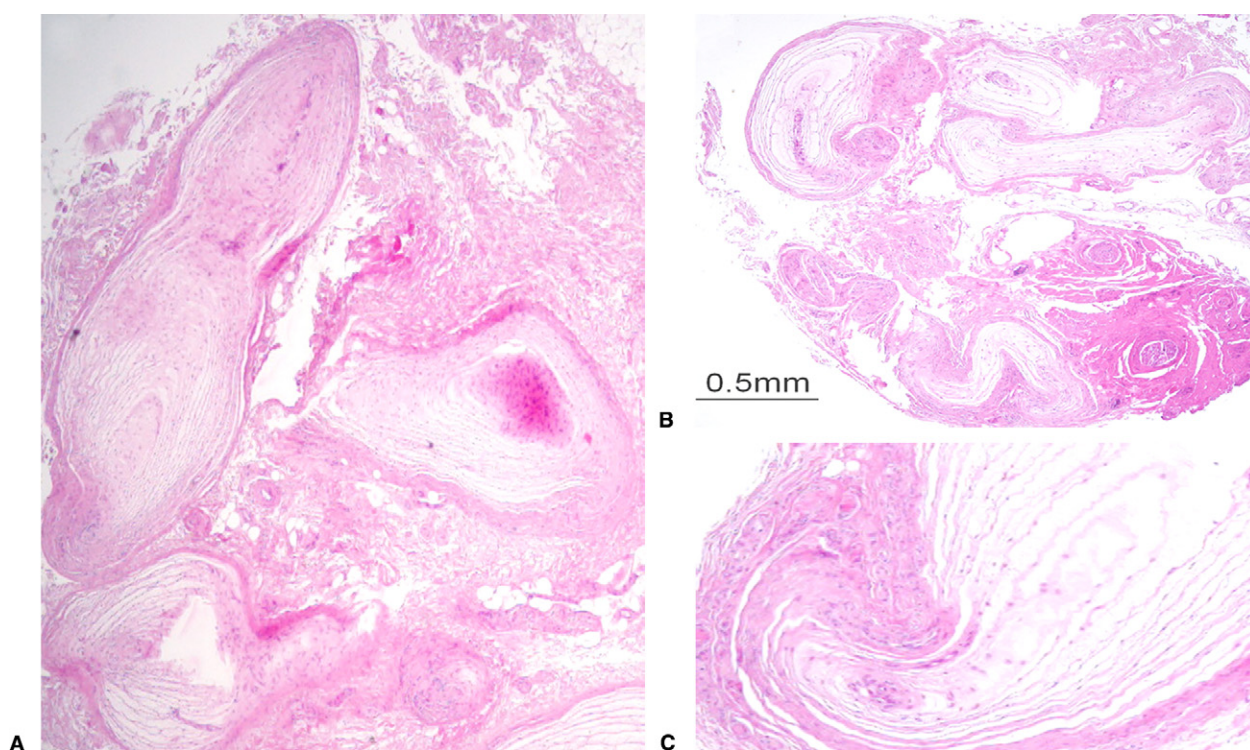


FIGURE 5: Possible pacinian neuroma. **A** Overview: increased number of enlarged pacinian bodies. **B** Enlarged pacinian bodies embedded in loose and dense fibrous tissue (bottom right). **C** Higher magnification of **B**: regularly structured mature pacinian corpuscle.

All our patients were free of pain after resection of the fibrous tissue. Even though they described different kinds of pain, as is also seen in other compressive nerve disorders, other nerve compression syndromes were not present in our patients.

Although all our patients were pain free after surgery, this does not mean that our small sample has shown that pain in Dupuytren disease is linked to the histological changes described. Pathological findings in biopsies taken from larger samples of patients with and without pain are required, with examination of many thin sections throughout the entire specimen with special dyeing techniques for nerve fibers.

We, therefore, suggest that the indication for surgery in Dupuytren disease be extended to the presence of painful nodules for more than 1 year, even in the early stages of the disease in the absence of functional deficits, and include an assessment of tissue samples for histological changes in nerve fibers.

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