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HISTOLOGICAL STAGING AND DUPUYTREN'S DISEASE RECURRENCE OR EXTENSION AFTER SURGICAL TREATMENT: A RETROSPECTIVE STUDY OF 124 PATIENTS

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Dupuytren's disease has a high rate of recurrence after treatment. In this study we have assessed the usefulness of histological staging in the prediction of recurrence. We have also verified whether there is a correlation between histological staging and features of Dupuytren's diathesis. We studied 139 hands in 124 Caucasian patients treated between 1997 and 2004. There was a significant difference in the recurrence rate between the three histological types ($P = 0.04$). Histological staging was independent of features of Dupuytren's diathesis. This study confirms that histological staging is a reliable method for predicting recurrence. However, it should be used in association with clinical data to determine precisely the prognosis of patients suffering from Dupuytren's contracture.

Keywords: Dupuytren's disease, Dupuytren's diathesis, histological staging, risk factor, recurrence, extension, Dupuytren's disease prognosis

INTRODUCTION

The pathogenesis of Dupuytren's disease (DD) is not completely understood. It occurs mainly in Caucasian people of northern European descent (Burge, 1999) and 80–90% of patients are men (Wilbrand et al., 1999). Several factors are correlated to the occurrence of the disease, such as diabetes (Renard et al., 1994), epilepsy (Critchley et al., 1976), alcohol (Noble et al., 1992) or familial history of DD (Ling, 1963).

The main treatment of DD is the surgical removal of the abnormal tissues. However, patients with DD may experience recurrence or extension of the disease. The recurrence rate is between 45% (Vigroux and Valentin, 1992) and 66% (Leclercq, 2000) after 10 years.

Over the last decades, surgeons have been searching for factors that allow the prediction of recurrence of DD. Hueston (1963) described the 'Dupuytren's diathesis', which is a marker of aggressive disease with a higher risk of recurrence. Hueston's diathesis was based only on clinical factors: ethnicity, positive familial history of DD, ectopic lesions and bilateral disease. Hindocha et al. (2006) added two clinical parameters to Hueston's diathesis: early age of onset (before 50 years) and male gender.

Many authors have mentioned the concept of a relationship between a highly cellular DD tissue and a high rate of recurrence. Luck (1959) studied the pathogenesis of DD and divided the evolution of the disease into three stages: proliferative, involutional and residual stages. Later Tyrkkö and Viljanto (1975) reported that the most valuable prognostic sign was the appearance of several active nodules. Moreover, they stated that the number of mitoses was a minor prognostic factor. In 1978, Chiu and McFarlane (1978) pointed out a correlation between clinical features of the disease and histological observation. Gelberman et al. (1980) reported a relationship between the findings of myofibroblasts and recurrence of the disease. Rombouts et al. (1989) proposed a three-stage histological classification of DD and pointed out a relationship between the histological type of DD and the recurrence rate. Unfortunately, this classification has not been used subsequently.

Since 1997, all DD patients operated on in our unit have been staged using Rombouts' classification.

This study had two objectives: to assess the usefulness of histological staging in the prediction of recurrence and/or extension of DD and to find out whether there are relationships between histological staging and DD diathesis factors.

PATIENTS AND METHODS

We studied retrospectively the records of patients with a diagnosis of DD treated during a 7-year period from 1997 to 2004. A total of 170 Caucasian patients with primary DD had 191 operations during this time. Of these patients, 22 were lost to follow-up, nine died and 15 had incomplete data. In all, 139 hands in 124 Caucasian patients were examined. There were 102 (82%) men and 22 (18%) women. The average age at surgery was 64 years (range 29–82). The mean duration of disease before surgery was 6.1 years (range 1–20). The mean follow-up period was 5 years (range 3–11).

All patients had a regional fasciectomy under axillary block anaesthesia. The indications for surgery were a metacarpophalangeal contracture of at least 30° or any degree of proximal interphalangeal joint contracture. Skin grafting was never done. The DD tissue was sent for histological examination and staging.

At follow-up all patients had clinical examination by one of the authors (S.D.) who was not informed of the histological type of DD. During the clinical examination recurrence, extension and DD diathesis parameters were assessed. False recurrences caused by scar contracture, joint contractures and extrinsic tendon imbalance were distinguished from true recurrence (Iselin, 1974).

Recurrence was defined by the reappearance of DD in a zone previously operated on, while extension was the appearance of lesions outside the operated area (Hueston, 1963).

The DD diathesis parameters assessed were: a family history of DD (first and second degree); an early onset of the disease (younger than 50 years); ectopic lesions (Garrod's pads, Ledderhose's disease and Peyronie's disease) and bilateral palmar lesions; gender and ethnicity.

Histological examination and staging

All surgically removed tissue was fixed in formol, sliced into 2–4 mm thick pieces of tissue, and embedded in paraffin. Before microscopic examination, slides were stained by hematoxylin, eosin and safran.

We used the classification used by Rombouts et al. (1989). The lesions were classified into three histological types according to the cellularity of the removed material.

Type I or proliferative stage: the lesions are highly cellular but the cells show no cytonuclear atypia with small and pinpoint nucleoli. This stage is characterised by the presence of mitotic figure that are few in number and not atypical. They are found in very cellular fibroblastic nodules (Fig 1).

Type II or fibrocellular stage: this is an intermediate stage with highly cellular nodules and areas with reduced cellularity and abundant collagen fibrosis. The absence of mitoses is the differential criterion between theses types (Fig 2).

Type III or fibrotic stage: removal material is considerably less cellular with increased amounts of dense and hyaline collagen arranged in broad bundles (Fig 3).

Histological grading was homogenous in type I and type III groups. Indeed in the type I group lesions were highly cellular with mitoses and in the type III group lesions were of low cellularity with abundant collagen.

However in the type II group histological findings were heterogeneous for the most part with highly cellular nodules and other areas with reduced cellularity.

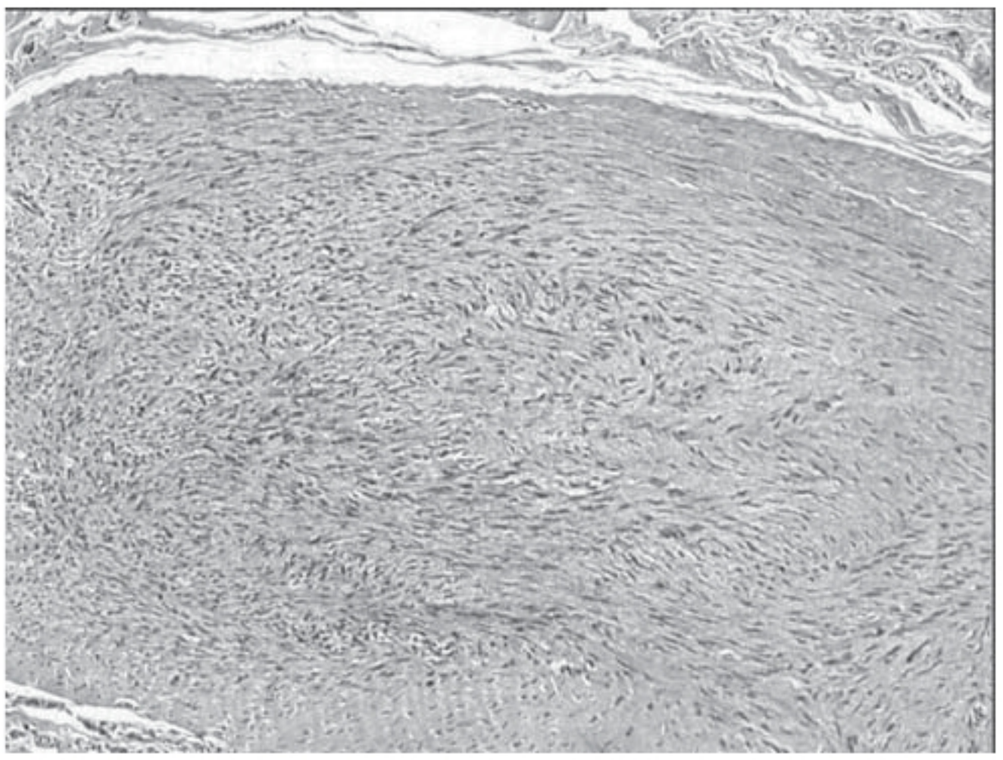

Fig 1 Histological type I Dupuytren's disease, high cellularity with mitoses.

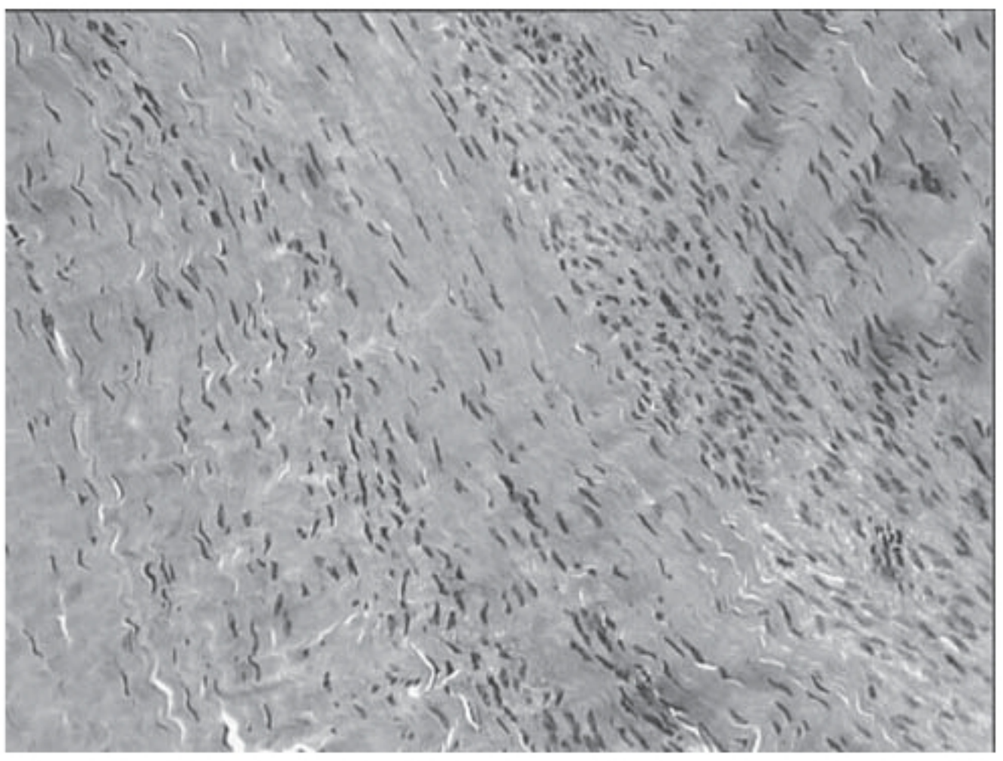

Fig 2 Histological type II Dupuytren's disease, moderate cellularity.

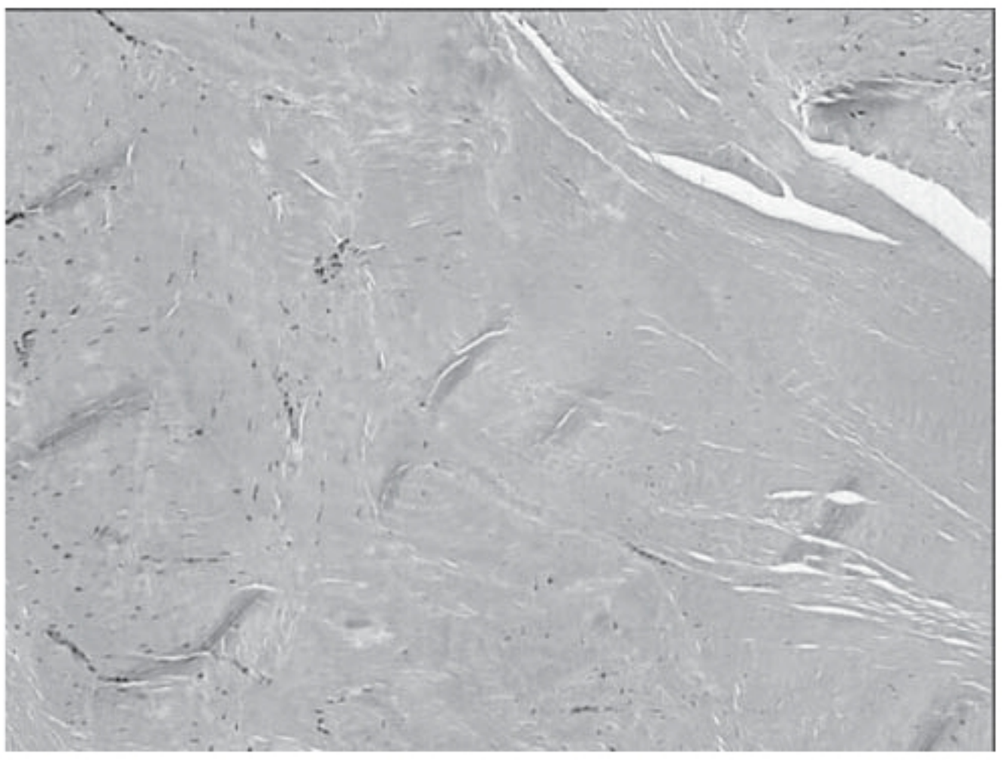

Fig 3 Histological type III Dupuytren's disease, less cellular with increased amounts of collagen.

Statistical analysis

Statistical significance was set at $P<0.05$.

We studied the relationship between recurrence or extension and the histological staging using the chi-squared test and Fisher's test as the data were expressed in frequencies (percentage). Logistic regression was used to calculate odds adjusted for each histological type; this gave us the odds of developing recurrent DD based on the histological staging.

We used the chi-squared test and Fisher's test to study the relationship between histological findings and features of DD diathesis.

RESULTS

Histological staging and recurrence or extension

From the 139 hands with DD, 22 were type I (16%), 90 were type II (65%) and 27 were type III (19%).

Table 1 shows the disease duration, mean age at surgery and follow-up of the three histological types. Recurrence occurred in 43 (31%) hands.

In the type I group, 12 patients (55%) experienced recurrence. In the type II group, 28 patients (31%) experienced recurrence. In the type III group, three patients (11%) experienced recurrence. There was a significant difference in the recurrence rate between the three histological groups ($P=0.04$).

Logistic regression showed that type 1 hands had a recurrence risk 2.5 times higher than type II hands ($P=0.04$). The recurrence risk was 10 times higher in type I hands than in type III hands ($P=0.002$). Recurrence risk was three times higher in type II than in type III hands ($P=0.05$).

One patient had bilateral operations, one side was type I and the second side was type III, after 7 years of follow-up the type I side had a recurrence but the type III side did not.

Table 2 shows the rate of recurrence among the three histological groups during the follow-up period. Recurrence among histological type I and type II occurred sooner than in type III hands. Indeed there was no recurrence until 8 years' follow-up in the type III group.

Extension occurred in four (18%) type I patients, in 13 (14%) type II patients and in five (18%) type III patients. There was no significant difference in the extension rate in the three groups. The overall extension rate was 16% (22/139 hands). The 'extension without recurrence' rate was 6.4%.

Histological staging and Dupuytren's diathesis

The statistical analysis of the relationship between histological findings and Dupuytren's diathesis parameters is presented in Table 3.

Table 1—Disease duration, mean age at surgery and follow-up in the three histological types

	Type I	*Type II*	*Type III*	*Total*
Hands	22 16%	90 65%	27 19%	139
Median duration of the disease (years)	5.1	6.4	5.9	6.1
Mean age at surgery (years)	63.6	64.4	65.5	64.5
Follow-up (years)	4.8	4.9	5.6	5

Table 2—Recurrences with time in the three histological groups

	3–4 years' follow-up	*5–7 years' follow-up*	*8–9 years' follow-up*	*Total*
Type I	37% 11%/y	57% 10%/y	71% 8%/y	54%
Type II	30% 9%/y	31% 5%/y	32% 4%/y	31%
Type III	0% 0%/y	0% 0%/y	20% 2%/y	11%
Total	26% 7%/y	29% 5%/y	36% 4%/y	31%

Histological staging was not correlated with any of the features of the DD diathesis. Histological staging was an independent risk factor for recurrence.

DISCUSSION

In 77 hands, Rombouts et al. (1989) found 13 (17%) type I, 42 (55%) type II and 22 (29%) type III. The recurrence rate was 39%. The extension without recurrence rate was 32%. The overall extension rate was 67%. Rombouts et al. showed that histological type was correlated with the recurrence risk and was not correlated to extension risk.

Our findings corroborate Rombouts' conclusions; we found a significant difference in recurrence rate among the three groups of patients but we were not able to show any difference in extension rates. The recurrence rate was higher in type I (proliferative stage) and lower in type III (fibrotic stage). The main difference between our series and that of Rombouts et al. (1989) is the higher rate of extensions in their study (67%).

As also noticed by Hueston (1963), extensions were less frequent than recurrences in our series (31% recurrences, 16% extension). However, type III hands experienced more extensions than recurrences (four extensions, two recurrences and one recurrence and extension). In type III hands, extensions without recurrence represented the major part of the total activity of the disease (57%) while in type I and type II hands, extensions without recurrence represented 7.7% and 12% of the total activity of the disease. Those differences were statistically significant ($P=0.01$ for type III compared with type II, and $P=0.02$ for type III compared with type I).

We found that extensions are more frequently associated with recurrence in type I (75%) and type II (69%)

Table 3—Histological staging and features of Dupuytren's diathesis

	Type I	*Type II*	*Type III*	*Total*	*P-value for difference between groups*
Number of hands	22	90	27	139	
Early onset of the disease	5	23	5	33	n.s.
Male gender	18	72	25	115	n.s.
Positive family history	6	22	10	38	n.s.
Ectopic lesions	4	11	1	16	n.s.
Bilateral disease	16	64	16	96	n.s.

n.s.: not significant.

hands than in type III hands (20%) but this was not statistically significant.

We were unable to show any statistical relationship between the histological type and any of the features of Dupuytren's diathesis listed by Hindocha et al. (2006). Therefore histological staging is an independent risk factor for recurrence in DD.

Moreover we were unable to find any correlation between the clinical presentation and histological groups. The type I group was more frequently associated with ectopic lesions and had a shorter median duration of disease but this was not statistically significant.

Histological staging is a reliable method for predicting recurrence of DD and the pathologist can easily distinguish the three histological groups. However the main drawback of this method is the cost generated by the histological assessment of all the DD tissue removed surgically.

Although the histological type of DD can help predicting postoperative recurrences, it should be used in association with clinical data to determine precisely the prognosis of patients suffering from Dupuytren's contracture.

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