THE PATHOLOGY OF DUPUYTREN'S CONTRACTURE

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DUPUYTREN'S contracture is a lesion of the palmar fascia often resulting in flexion deformity of the fingers. Usually the onset is insidious and the lesion is first observed as a painless nodule in the palm of the hand over the head of the fourth metacarpal. It may appear in other sites in the palm, and in some cases in the plantar fascia. In advanced cases the affected finger is drawn tightly against the palm (Hammond and Dotter, 1948). The lesion may extend to involve skin and interosseous fascia, and occasionally appears above the wrist.

While Dupuytren's contracture has been known for centuries and numerous studies made, there is still disagreement as to the exact nature of the pathological process (Abbott, 1929; Kanavel *et al.*, 1929; Byford, 1921; Corlette, 1944; Bunnell, 1944; Skinner, 1941).

This report is based on the examination of seventy-seven specimens of involved palmar fascia removed from sixty-five white patients. All sixty-five were under the care of the Department of Veterans' Affairs.

Dupuytren's contracture would appear to be a disease of middle and old age (Kanavel *et al.*, 1929; Ayre, 1946; Skoog, 1948). In this series all patients were veterans of the First and Second World Wars.

TABLE I

Age Distribution of Patients on First Admission for Dupuytren's Contracture

Age Range (inclusive).	*Number of Patients.*
21 to 25	2
26 to 30	6
31 to 35	9
36 to 40	9
41 to 45	10
46 to 50	8
51 to 55	12
56 to 60	4
61 to 65	2
66 to 70	3
Total	65 patients.

It will be noted from Table I that over half of this group were under 50 years at the time of treatment. The fact that these patients were entitled to treatment might have been a factor in their reporting relatively early for help.

Of these sixty-five patients only two were females. This incidence is in line with other reports (Clay, 1944; Kanavel *et al.*, 1929; Meyerding, 1935; Corlette, 1944; Skoog, 1948).

It is curious that this disease tends to be bilateral. This is a strong argument against trauma as a major ætiological factor. The sixty-five patients in this series

had the right hand affected alone in fifteen, the left hand in ten, and forty had bilateral lesions. Of those seeking treatment for Dupuytren's contracture, 62 per cent. will have, or will develop in less than five years, bilateral lesions.

The disease always starts as a thickening and nodularity of the palmar fascia. It may spread beyond the bounds of its origin to involve skin, tendon sheaths, interosseous fascia, and joint capsule. It never becomes malignant, nor does it form metastases.

TABLE II

	Numbers.	Right.	Left.	Bilateral.
Hume	118	57	21	40
Anderson	39	10	5	24
Black	240	89	47	104
Byford	38	9	4	25
Costhilles	77	14	8	55
Kanavel, Koch, and Mason	29	4	8	17
Keen	184	58	23	103
Scholle	54	28	8	18
Davis and Finesilver	40	8	6	26
A. A. Davis	31	7	6	18
Meyerding	273	69	29	175
Gordon	50	12	4	34
	1,173	365	169	639

(*Table after Gordon*, 1948.)

Nine specimens included palmar skin. All but one showed hyperkeratinisation. Three cases showed a shortness of epithelial pegs, while the other six presented normal or longer than normal pegs.

Fig. 1 shows a typical section of epidermis taken over a nodule of palmar fascia. It demonstrates the thickened horny layer of hyperkeratinisation. This overlies an essentially normal corium with well-marked epithelial pegs. It is true these are not the long papillary processes usually seen in skin, but are sufficiently well marked to be described as within normal limits. There is some blunting at the apices of some of these pegs, but the most characteristic feature of this section is the replacement of normal subcutaneous tissue by dense fibrous matrix which is devoid of fat and is incorporated into the basal layer of epidermis in an intimate manner. This skin is firmly adherent to the lesion beneath it and the section shows why this is so. It is infiltrated by fibrous tissue from below. This dense collagenous matrix is identical in architecture and histological pattern with that of the lesion itself. This constitutes one aspect of the infiltration process which is a feature of Dupuytren's contracture.

In discussing adipose tissue around palmar fascia one must make a differentiation between that lying deep to skin but superficial to palmar fascia and that deep to palmar fascia. Some writers have failed to note this difference. They have described "loss of adipose tissue," which undoubtedly occurs where infiltration of the skin by the lesion takes place, as a feature of the disease, and suggest that there is loss of fat in other regions as well. Nothing could be further from the truth. This study found fat in abundance in the tissues received. Most of this was deep to the fascia, but some was found as vestigial islands of fat within the fibrous tissue of the lesion itself (Fig. 2).

Fat was present in seventy-five of seventy-seven specimens. A marked feature of this fat was the presence of strands of fibrous tissue seen in forty-three of seventy-five cases. This fibrous tissue occurred in the form of strands of collagen-like material, sometimes resembling tendons, sometimes with small whorl-like arrangements or septa of fibroblastic tissue. In most of these instances strands were continuous with the main body of the lesion and represented an infiltrating process into fat tissue.

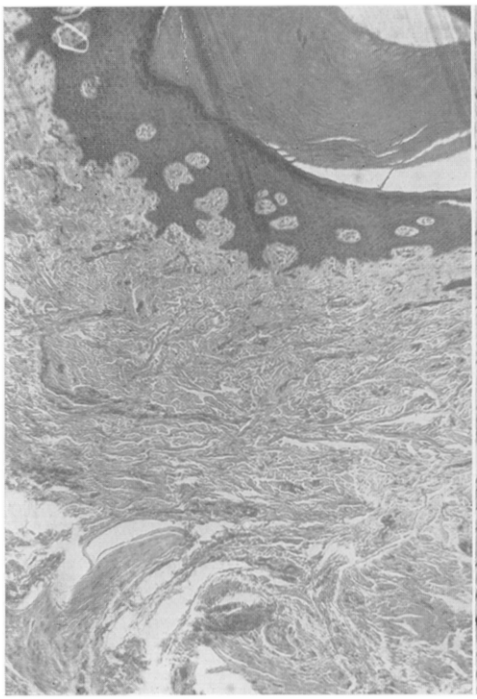

FIG. 1

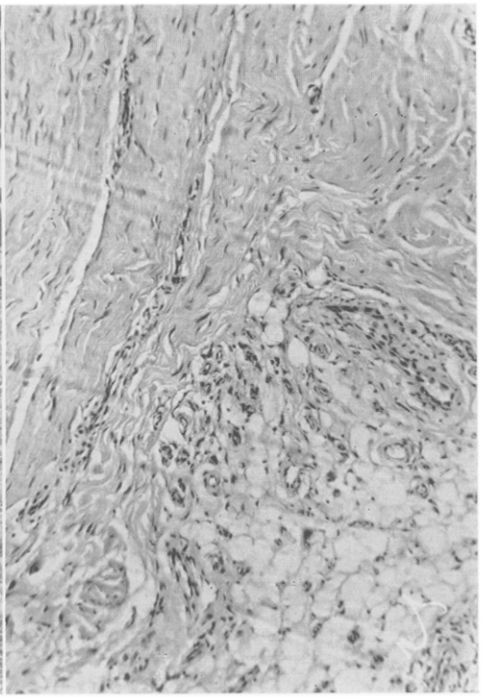

FIG. 2

Fig. 1.—Section taken through nodule of skin overlying palmar fascia nodule. Note the hyperkeratinisation and the infiltration of subcutaneous tissue by inroads of fibrous tissue running in all directions and replacing fat. (Low power.)

Fig. 2.—Low-power view of section taken through the edge of palmar fascia. This shows a fibrous tissue architecture resembling tendon but with small infiltrating strands into the adipose tissue remaining. Numerous small blood-vessels surrounded by a mild chronic inflammatory cell reaction are seen at the edge of the fibrous tissue.

Sweat glands or small ductules were identified in forty-nine of seventy-seven specimens studied. Other writers have ascribed particular roles to these structures, some claiming their absence or diminished numbers (Kanavel *et al.*, 1929; Meyerding *et al.*, 1941), and others noting pathological changes in the walls of their ducts (Davis and Finesilver, 1932). In this series it was frequently observed that sweat glands appeared not only in their adipose environs, but just as often surrounded by dense fibrous tissue. Some were found deep within the connective tissue of the lesion. Some were surrounded by clumps of chronic inflammatory cells, although this was by no means a constant feature. The infiltrative nature

of this abnormal palmar fascia was again shown, however, in its readiness to surround and insulate the tubules and sweat glands themselves. No increase in the thickness of the walls or in the connective tissue of these walls was noticed unless it was believed the surrounding fibrous tissue belonged to the duct walls (Fig. 3).

The presence of collagenous scar tissue or dense fibrous tissue is the end product of healing, which in itself is initiated by inflammation. Chronic

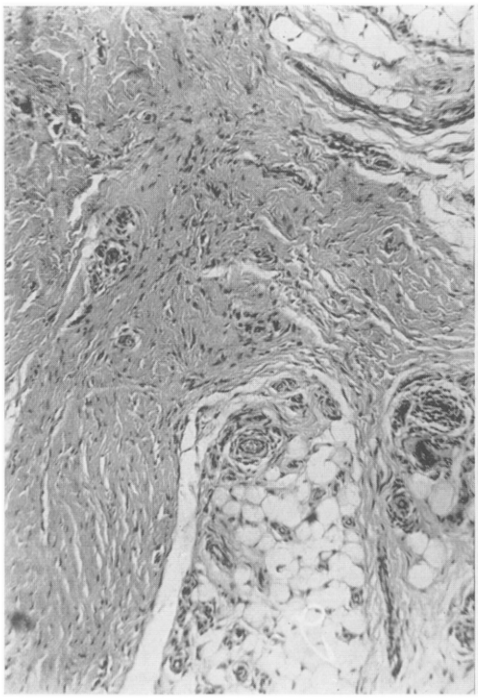

FIG. 3

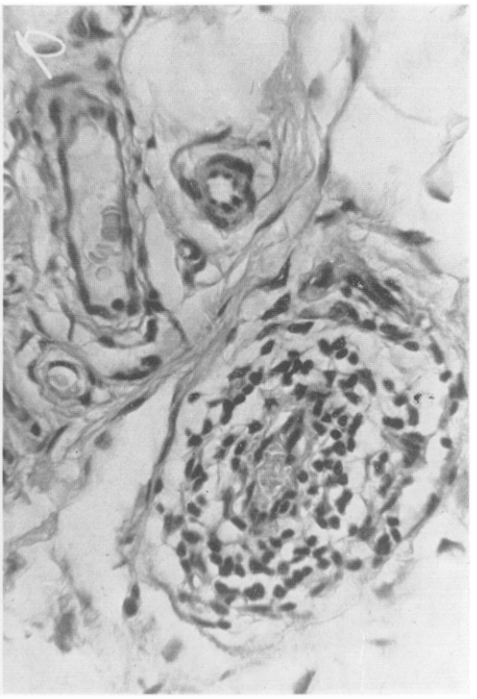

FIG. 4

Fig. 3.—This low-power view of fat and fibrous tissue demonstrates the infiltrative nature of palmar fascia tissue in Dupuytren's contracture. Blood-vessels and sweat glands are surrounded by chronic inflammatory cells. Adipose tissue is being slowly replaced by fibrous tissue.

Fig. 4.—High-power view of one section of Fig. 3 to show the perivascular cells in adipose tissue. Note erythrocytes in a small blood-vessel.

inflammatory cells in the presence of fibroblastic tissue are not evidence of chronic inflammation as the basis for fibrous tissue proliferation. Much interest, therefore, centres on the role played by lymphocytes around palmar fascia. If they herald the entire process as an inflammatory sequence they should be in all but old, well-healed (fibrosed) lesions.

A search for chronic inflammatory cells showed these to be present in appreciable amounts in forty-four of seventy-seven specimens and absent in thirty-three. In those cases where they were noted there was a particular perivascular distribution in forty-two. In only two instances were these cells

within the fascial lesion itself. They were restricted to surrounding tissues in all others. This would appear to cast grave doubts on a chronic inflammatory basis for the disease. Furthermore, their distribution outside the lesion and confined to the subfascial and subcutaneous fat suggests that the lesion is the cause rather than the result of their presence (Fig. 4).

Fat is normally remarkably avascular tissue. Consequently, the presence of large numbers of blood-vessels in palmar fat required explanation. Increased

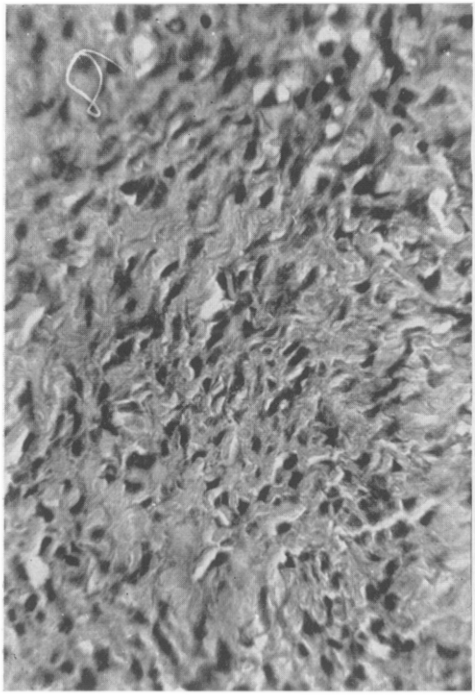

FIG. 5

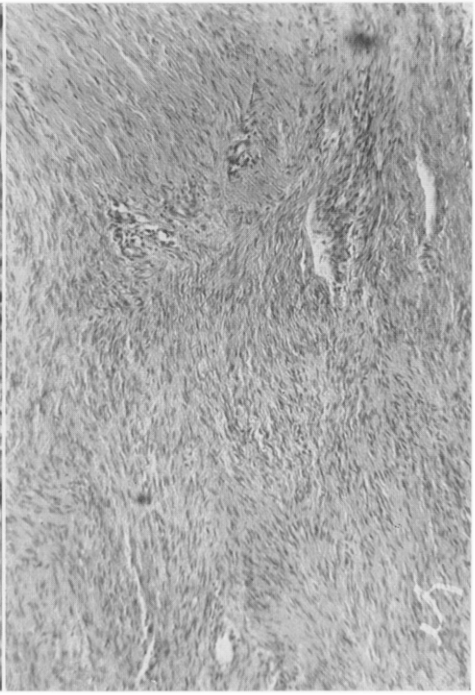

FIG. 6

Fig. 5.—High-power view of one type of fibrous tissue encountered in Dupuytren's contracture. Fibrocytes with darkly stained, plump, and oblong nuclei are growing in profusion. This picture is one of marked hyperplastic activity and is seen in palmar fascia which is growing rapidly to involve surrounding structures.

Fig. 6.—In contrast to Fig. 5, this represents the more common type of cellular pattern in the palmar fascia in Dupuytren's contracture. Long interlacing strands of collagenous material with elongated, faintly staining, nuclear cytoplasm present a picture of slowly growing fibrous tissue. Note the avascularity and minimal inflammatory reaction within the depths of the lesion.

vascularity was noticed in all except one specimen. Of these, sixty-five showed thickened walls, some to the point of almost complete obliteration of the lumina. More marked than these changes in small arteries were the increased numbers of capillaries which were seen throughout the adipose tissue, at the borders of the lesion, and in many cases extending into the lesion itself. Capillary vascularity is a feature of Dupuytren's contracture. These vessels appear to be actively growing young vessels. Their presence certainly cannot be explained by any opening up

of small channels as a result of operative procedures, for all operations were done on avascular fields with tourniquet. This is a true increased vascularity (Figs. 2, 3, and 4).

Two distinct types of connective tissue patterns were recognised in palmar fascia. They are probably variants only in activity, but may represent stages in development or have some clinical importance in considering the rate of growth (Horwitz, 1942 ; Kaplan, 1938).

The first is a pattern of wildly hyperplastic fibrous tissue, with darkly staining ovoid nuclei, which tends to grow in wavy strands and whorls. Their cellular arrangement resembles the smooth muscle cells of a uterine wall or a fibroid. Sometimes islands of this hyperplastic form are found surrounded by seas of the less active second type. There are no indications of chronic inflammatory cells in this form where they might reasonably be expected if inflammation was the basis for the disease (Fig. 5).

The second architecture was more commonly found. It consisted of a collagenous type of tissue, not unlike tendon or fascia, with strands and sheets of mature fibrous tissue cells with elongated wavy nuclei. Occasionally these are arranged in whorls, but the picture of a few nuclei on a pale staining background was in marked contrast to the hyperplastic fields (Fig. 6).

Both these types of fibrous tissue were remarkably lacking in blood-vessels and chronic inflammatory cells. A few fields showed Pacconian bodies or nerves surrounded by dense fibrous tissue. In no specimens were mitotic figures seen.

In many cases single slides or even single fields would yield both young and mature fibrous tissue. It was noticed that where this occurred the immature hyperplastic tissue was found more often at the periphery while dense collagenous forms were found within the central portion of the lesion. This at once suggested proliferation at the periphery.

SUMMARY

Seventy-seven specimens of palmar fascia were obtained in the surgical relief of Dupuytren's contracture. These have been studied histologically.

The lesion is described as due to growth and infiltration of palmar fascia into surrounding structures, becoming adherent to skin tendon sheaths and joint capsules. There is infiltration and insulation of neighbouring structures such as blood-vessels, nerves, and sense organs. Nearby fat becomes impregnated with fibrous tissue. The presence of young blood-vessels and perivascular clumps of lymphocytes is explained by the superadded factor of trauma to the growth of palmar fascia.

It has been noted that the disease is not limited to the older age group but occurs with considerable frequency in young adult males. It tends to be bilateral in the majority of cases.

The conception of this lesion as a benign neoplasm of palmar fascia best explains the clinical and pathological processes.

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