

## DUPUYTREN'S CONTRACTURE

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SINCE Dupuytren, in 1831, first established the fact that the palmar fascia and not tendon was involved in the disease which has, as a result, become known as Dupuytren's contracture, much has been written about it. Nevertheless, we still are not certain as to the factors responsible for the development of the disease, nor are we sure as to the nature of the pathological change. I wish to present to you certain facts as well as some impressions which have been gained from the study of some one hundred patients seen in the divisions of Plastic Surgery at the Toronto General and Christie Street Hospitals, of whom I have operated upon 51.

*Anatomy.*—The superficial palmar fascia consists of a central thickened portion, and two thinner lateral portions covering the thenar and hypothenar eminences. The central portion is a continuation of the palmaris longus. To this is added a layer extending distally from the anterior carpal ligament which fuses with the superficial portion about an inch distal to the ligament. This central portion—the portion almost always involved in Dupuytren's contracture—fans out from its rather narrow origin into, usually, 4 thickened longitudinal bands joined by thinner, more or less transverse fibres which lie deep to them. Three main septa project dorsally at right angles from the fascia to join the anterior interosseous fascia and so form fascial tunnels for the passage of nerves, vessels and tendons. The most radially placed septum extends further proximally than the other two. From the superficial surface of this central portion many short fibres extend at right angles to connect the fascia to the skin. Distally, the bands thin out, split into two and pass over the anterior and lateral surfaces of the fingers, where they fuse with the skin over the first and second phalanges.

*Pathology.*—The exact pathological nature of the lesion is still an open question. Early, and some recent, opinion has favoured a chronic inflammatory process as the basic change. Clay believes the lesion to be a definite fibroma, *i.e.*, a benign neoplasm. Certainly, if a tumour is a local tissue overgrowth, independent of the laws governing the rest of the body, and serving no useful purpose, it seems to me logical to regard the disease as neoplastic. Part of the difficulty may be that we have in Dupuytren's contracture a pathological change developing in a degenerated structure. The material from our cases is being studied and I hope that the results of this study will be presented at some time in the future.

*Etiology.*—The etiology of the lesion is unknown. Heredity (Table I) is one of the many

suggested factors that appear to have some realistic basis. Koch found 10 positive family histories in 13 physicians or members of physicians' families suffering from the disease. Of 37 personal cases in which records would seem to be accurate, only 4 gave a positive family history. The male parent had had the disease in 2 instances, the mother in 1. A brother had a similar lesion in the fourth instance. Couch has recorded an interesting example of the disease occurring in identical twins.

TABLE I.

Cases	Family history	
	Positive	Negative
McWilliams ....	24	22
Janssen .....	16	16
Davis .....	40	35
Keen .....	198	148
Gordon .....	37	33
	<u>315</u>	<u>254</u>

It may well be, as Manson has pointed out, that the part heredity plays does not show fully since many die before senescent hereditary defects appear.

Trauma has been regarded as a responsible factor since the disease was first described. Nevertheless, the disease appears to be commoner in non-workers than in workers (Table II).

TABLE II.

	Cases	Workers	Non-workers
Black .....	131	63	68
Byford .....	38	24	14
Keen .....	123	49	74
Kanavel, Koch and Mason	29	10	19
Davis and Finesilver ....	40	20	20
Meyerding .....	273	123	150
	<u>634</u>	<u>289</u>	<u>345</u>

Oller pointed out in 1929 that it was comparatively rare in those doing manual labour. An occasional patient is seen in whom trauma appears to have played a part. Usually the individual has been attempting to lift a heavy weight and has suddenly developed a sharply localized stinging pain in the palm. This area has remained tender on pressure, and within a month or so a typical nodule has appeared. The continuity of the story forces conviction.

Many diseases are listed in the literature as being associated with, or influencing, Dupuytren's contracture. Gout, arthritis, endocrine deficiencies, diabetes mellitus, lead poisoning, ulnar nerve lesions, syphilis, ganglionitis, cervical rib and coronary thrombosis are among those mentioned. Powers believes that Dupuy-

tren's contracture is not a clinical entity but rather a diagnostic sign. The causative factor, in his opinion, is past or present visceral disease producing irritation of the sympathetic nervous system. Kehl, discussing 6 cases of Dupuytren's contracture following coronary occlusion, concludes that the palmar lesion appears to be a complication of or sequel to the cardiac condition. On the other hand Johnson, reporting 39 instances of trophic changes occurring in the hands of 178 consecutive cases of myocardial infarction, does not mention Dupuytren's contracture. Nor does Evans in a discussion of reflex sympathetic dystrophies. In my opinion, coincidence probably accounts for the suggested association of Dupuytren's contracture with other syndromes. At the very least we must return the Scottish verdict of "not proved". Of 40 personal cases 30 had no evidence of other disease, 1 had an ulnar nerve lesion, 5 had arthritis, 1 had prostatic enlargement, 1 had

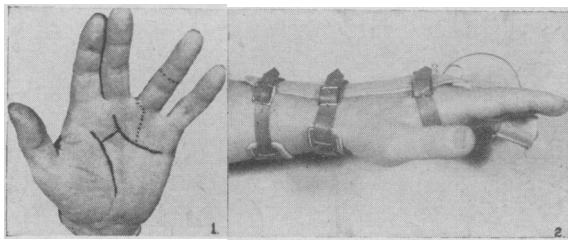


Fig. 1.—The routine incision for opening the palm is shown. The incision used for operating upon an extension to the fourth finger is indicated. Fig. 2.—The extension splint used to improve extension of a finger (or fingers).

degenerative heart disease and 2 had healed pulmonary tuberculosis.

**Incidence.**—Dupuytren's contracture is not a rare disease. Its prevalence is difficult to ascertain. Ayre reported 64 instances in 486 Veterans' Guard of Canada. Davis and Finesilver found 7 lesions in 641 old people in the Baltimore City Hospital. Noble and Smith noted 70 cases in 700 inmates of London workhouses, and 40 cases in 1,000 soldiers. Anderson examined 2,600 persons and found 33 suffering from the disease. Byford found 37 in 1,106 persons. Thus figures from over 1 to 13% are to be found in the literature. Dupuytren's contracture caused 70 admissions of 2,177 to the Plastic Division at Christie Street Hospital during 1945, 1946 and the first 6 months of 1947.

**Clinical course.**—The disease may occur in an acute or chronic form: the latter is by far the

commoner. I have seen the acute form twice. The hand becomes swollen, stiff and painful. Inflamed areas appear on the palm which are later the sites of thickening.

TABLE III.

	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

The usual chronic form develops over months or years and may show exacerbations and remissions. Typically a painless nodule appears just distal to the distal transverse crease opposite the ring finger. It may gradually produce a small funnel-like depression in the skin. Quiescent for months or years, the thickening gradually extends proximally and distally along the palmar fascia, slowly limiting extension of the ring finger. A similar lesion may now appear opposite the fifth finger. Further interference with function may be negligible or extension is lost progressively until the fingers are held fully flexed. By this time the mid, and probably the index fingers are involved. When the patient reports for treatment bilateral involvement is the rule. If one hand only is affected, it is usually the right (Table III).

TABLE IV.

	Cases	Thumb	Index	Mid	Ring	Little
Anderson .....	39	4	3	22	39	28
Byford .....	38	4	1	10	35	18
Kanavel, Koch and Mason ..	29	4	3	9	31	27
Noble and Smith	70	1	6	10	42	30
Keen .....	214	11	24	73	199	165
Scholle .....	54	1	5	9	45	28
Davis and Finesilver ..	40	3	6	14	40	43
A. A. Davis .....	31	0	0	5	27	26
Gordon .....	50	0	2	18	61	40
	565	28	50	170	519	405

While the majority of cases complain only of a painless deformity, some do have tenderness particularly on pressure. A few are troubled by cramps which may be more marked at night. Others suffer stiffness in the hand, most marked on wakening. Numbness, itching,

and aching are complained of in a few instances. The lesion may develop in the plantar fascia. In my series, such a lesion was seen twice in association with a palmar lesion, and once as a separate entity.

TABLE V.

	Cases	Males	Females
Keen .....	227	187	40
Anderson .....	39	25	14
Black .....	240	221	19
Byford .....	38	35	3
Kanavel, Koch and Mason .....	29	27	2
Davis and Finesilver ..	40	35	5
Noble and Smith .....	11	10	1
Daescher .....	18	17	1
Janssen .....	16	15	1
Costhilles .....	17	16	1
A. A. Davis .....	31	30	1
Gordon .....	51	46	5
	<u>757</u>	<u>664</u>	<u>93</u>

Dupuytren's contracture occurs more commonly in males, there being slightly more than 7 males to 1 female with the disease (Table V). The lesion is seen most often between the ages of 40 and 60.

*Treatment.*—Not all those suffering from Dupuytren's contracture require active therapy. A symptomless lesion which is not becoming worse need not be treated but should be watched. Pain, soreness and interference with function, particularly in a lesion which is progressing, indicate the need for treatment.

liminary to such excision. No operative interference should be done during the acute phase or during an exacerbation. All cases requiring operation should have the palmar fascia completely excised. If skin is hopelessly involved, it should be excised and replaced by a thick dermatome or a free full thickness graft. Grafting was necessary in 11 of 62 operations.

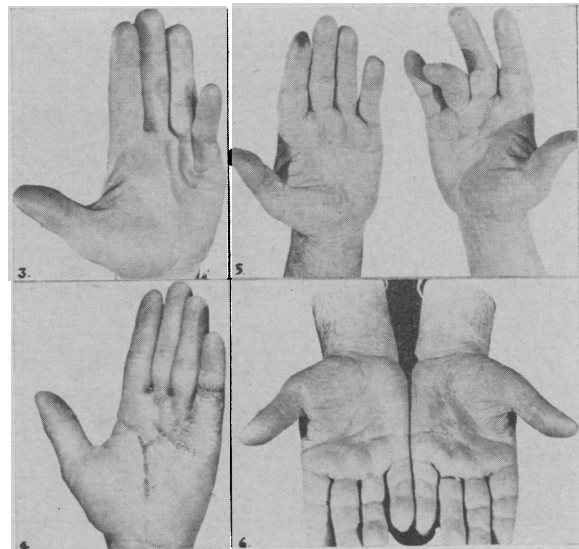


Fig. 3.—Typical preoperative appearance (February 27, 1946). Fig. 4.—Postoperative photograph taken March 21, 1946. Figs. 5 and 6.—Another illustrative case. The lesion in the left hand was early, but progressing. Preoperative photograph December 17, 1945; postoperative April 2, 1946.

TABLE VI.

Cases	AGE OF ONSET						
	Under 30	30 to 39	40 to 49	50 to 59	60 to 69	70 to 79	
Nichols .....	45	1	7	6	16	12	3
Kanavel, Koch and Mason .	29	4	6	11	5	3	..
Costhilles .....	60	9	6	9	21	15	..
Scholle .....	54	8	9	12	15	10	..
Davis and Finesilver .....	35	5	9	12	6	3	..
Gordon .....	70	10	15	22	16	6	1
	<u>293</u>	<u>37</u>	<u>52</u>	<u>72</u>	<u>79</u>	<u>49</u>	<u>4</u>

Treatment is surgical. Radiation therapy, the injection of humanol, and the exhibition of thyroid extract have been tried but improvement has been slight or transitory and their value has not been established. Surgical treatment consists in doing either a multiple subcutaneous fasciotomy or completely excising the palmar fascia. The former was advocated by Adams in 1890 and as recently as 1932 Davis wrote: "It remains an operation of considerable value, perhaps of greatest value . . .". In my opinion this purely palliative procedure should be done only if the patient is unable, for physical reasons, to have the palmar fascia excised; or as a pre-

Operation is best done under general anaesthesia. A pneumatic tourniquet is placed above the arm and pumped to 250 mm. pressure after the arm has been elevated to empty the veins by gravity. The incision illustrated in Fig. 1 has become routine. Raising the two flaps gives complete access to the fascia. The short cross incision should not be over, but to one or other side of the third metacarpal. It will be noted that the main incisions are placed in flexion lines. There is sound reasoning for this, since, as Wood Jones has pointed out, flexion lines indicate "points of comparative skin rest". If the lesion extends into a finger (or fingers) the

incisions should be so placed that there will not be interference with joint movement at a later date.

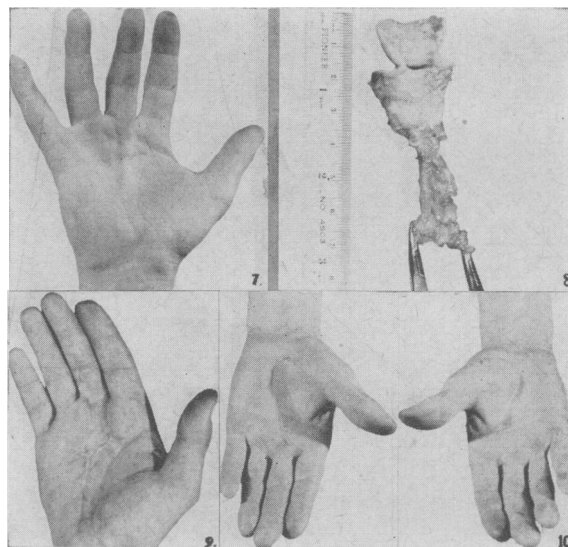
Once the skin has been elevated, dissection of the fascia is started at or just beyond the distal border of the anterior carpal ligament. The portion of the palmar fascia arising from the palmaris longus is divided and turned down. This brings into view that portion of the fascia arising from the anterior carpal ligament. A transverse cut is made across this fascia and it is also turned distally, being gently freed by sharp dissection at the sides and underneath. Just distal to the point where these two layers fuse, dissection is commenced along the radial border of the fascia. The fascia is then removed in one piece, from the radial to the ulnar side of the hand and including any extension to the fingers.

Removal in this manner with the sharp dissection in the direction of the important structures in the palm, lessens the danger of injury to any of them. Only twice have I divided a digital nerve in carrying out this procedure. Immediate suture of the nerve should be done whenever such an accident occurs. The digital nerve is almost always displaced by extensions of the lesion to the finger; occasionally as far as the opposite side of the finger.

All blood vessels perforating the fascia noted while the skin is being elevated are caught with forceps and ligatured with fine plain catgut. Once the fascia is removed, obviously divided vessels are tied off with catgut. Gauze wrung out of normal saline is then packed into the operative area and firmly held while the tourniquet is released. After a minute or so the gauze is removed slowly from the base of the palm distally and all bleeding vessels caught and ligated. Oozing points are controlled with the electro-cautery. Great care should be taken to prevent the development of a postoperative hæmatoma. Once bleeding is controlled the tourniquet is re-applied and the incision closed with interrupted silk to ensure accurate approximation of the skin edges. A pressure dressing is applied, the fingers as a rule being kept free. Once the dressing is on, the tourniquet is removed.

The patient is encouraged to move the fingers as soon as he is awake. The dressed hand is elevated for 48 hours. At the end of 24 hours the dressing is removed. An hæma-

toma should be evacuated. The pressure dressing is reapplied and remains in place for another week. It is then replaced by an ordinary dry dressing. As the skin of the palm heals slowly stitches are not removed until the 18th or 21st day. If the skin edges are not completely healed, the hand is kept relatively quiet until they are. When healing has taken place, the palm is usually thicker than normal and neither complete flexion nor extension are possible. Physiotherapy is then commenced and continued until full return of function occurs, or until improvement ceases, usually 2 to 3 months.



**Fig. 7.**—Marked involvement of the skin. The operative specimen, including skin from the palm and the palmar surface of the proximal phalanx of the mid finger, is shown (Fig. 8). The result after excision followed by dermatomic grafting is seen in Fig. 9. Photographs were taken October 20, 1945, October 22, 1945, March 19, 1946. **Fig. 10.**—March 10, 1947, shows a band of subcutaneous thickening, from the base of each thumb medially and distally. No change in the lesion up to October, 1947.

It will be noted that during the treatment, the hand has not been splinted. Hands that are the site of a Dupuytren's contracture show a very definite tendency to stiffen when splinted. This applies particularly to the metacarpo-phalangeal joints, but is true in lesser degree of all the joints of the hand. During the period of physiotherapy, however, the intermittent use of a dorsal traction splint may aid when extension is unusually slow in returning.

#### RESULTS

Forty cases have been followed for from 1 to 12 years. Twenty-six may be classed as

excellent results, 7 good, 3 are graded fair in that while the lesion has been removed, function has only been improved slightly. One was, and is, a poor result, the condition of this hand when last seen being worse than prior to operation. There have been 3 recurrences. The first was due to inadequate excision in that only the involved portion was removed. The lesion reappeared 19 months after operation and at the second operation considerable palmar skin had to be removed with the palmar fascia. The result today, 17 months after the last operation, is excellent. The second recurrence I am unable to account for as I had done what I believed to be an adequate operation. Recurrence was evident 11 months after operation. He has just left hospital with a complete range of movement in his hand following a second operation. The third case is, perhaps, incorrectly labelled as a recurrence. He reported for examination about 19 months after his operation with thickening and some tenderness in the web between each thumb and base of index finger. The palmar area of each hand is otherwise free of any evidence of Dupuytren's contracture.

Campbell, working at Christie Street Hospital, has shown that part of the gripping power of a hand is lost as a result of the excision of the palmar fascia. This may amount to as much as 25% of the normal power.

#### CONCLUSION

Dupuytren's contracture is a fairly common lesion of the hands and is occasionally seen in the feet. Its etiology is unknown; its pathology questionable. It is commonest in males, and develops most frequently between the ages of 40 and 60. When first seen clinically, both hands are involved in the majority of instances; if only one hand is involved, it is usually the right. Finger involvement occurs in the 4th, 5th, 3rd, 2nd and thumb, in that order, the 4th being involved 10 times more frequently than the 2nd. The only satisfactory treatment is the excision of the palmar fascia, together with hopelessly involved skin. Skin replacement can be done satisfactorily with a thick dermatome graft. A good result may be expected in 85% of cases.

Illustrations from the Medical Art Department, Christie Street Hospital, Department of Veterans' Affairs.

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### RELATIONSHIP BETWEEN IMPAIRMENT OF LIVER FUNCTION AND PREMATURE DEVELOPMENT OF ARTERIOSCLEROSIS IN DIABETES MELLITUS\*

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ARTERIOSCLEROTIC disease of the heart, arteries and kidneys now accounts for approximately twice as many deaths amongst diabetics as all other causes of death combined. Arteriosclerosis is essentially a disease of people approaching and past middle life. Diabetes, though it occurs at all ages, is also essentially a disease of this type. Diabetics now also live much longer than before the advent of insulin. A high incidence of deaths from arteriosclerosis is, therefore, to be expected amongst diabetics. That this, however, does not alone explain the high mortality from arteriosclerosis may be clearly seen by comparing the causes of death among diabetics with those among non-diabetics according to age. These, particularly autopsy data, show that arteriosclerotic disease of the heart, arteries and kidneys is more common among diabetics than among non-diabetics at all ages. The findings of Root, Bland, Gordon and White<sup>1</sup> are an example. In a comparative study of 349 diabetic and 3,400 non-diabetic autopsies, the incidence of coronary occlusion, expressed as percentage of the total number of autopsies, was definitely greater in the diabetics than in the non-diabetics in all age groups investigated. The diabetic data were obtained in a clinic for

\* Part of an address delivered before the Osler Clinical Society, University of Vermont, College of Medicine, Burlington, Vt., March 26, 1948.