

Dupuytren's Contracture: A Comparative Study of Fasciectomy and Dermofasciectomy in One Hundred Patients

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This study reviews one hundred patients with Dupuytren's disease treated surgically by the Derby Hand Unit between January 1975 and September 1981. One hundred and twenty-eight operations were assessed with a follow-up period from nine months to ninety months, average thirty-eight months.

In thirty-five patients the overlying skin was excised and replaced by a full-thickness skin graft (dermofasciectomy). The remaining patients were treated by fasciectomy without skin excision.

The overall recurrence rate after surgery was found to be 46.5%. However skin excision and replacement following fasciectomy prevented any appreciable, if not all recurrence of Dupuytren's tissue. The function of the hand was assessed with regard to the improvement in flexion contracture; ability to flex the finger to the distal palmar crease; sensibility of the replaced skin; time to return to work and full activity. It was concluded that skin replacement did not jeopardise hand function.

Baron Guillaume Dupuytren in 1832 reviewed the pathology of the disease now bearing his name. The precise aetiology, the tissue source and the pathological mechanism of production of Dupuytren's disease remain controversial.

Genetic inheritance, trauma and associated diseases such as diabetes, epilepsy and alcoholism, have been implicated as aetiological factors. Ling's impressive work in 1963 gave a detailed account of familial inheritance based on an autosomal dominant gene. Hueston believed this to be too simple an explanation, suggesting the involvement of a genetic system. Epilepsy and diabetes occur more frequently in patients with Dupuytren's contracture than in the general population. Whether these diseases create a metabolic environment in which susceptible patients develop Dupuytren's, or whether the diseases are inherited together through linked genes, is unproven.

Dupuytren described the disease as one of the fascia of the hand. Hueston and MacCallum (1962), Luck (1963) and Gabbiani (1972) suggest that the disease begins as a nodule located in the fibro-fatty tissue between fascia and skin, which secondarily affects these tissues. Other authors: Skoog (1948 and 1963), Larson (1960), and McFarlane (1974) in his elegant description of the palmar and digital fascia, see no reason to implicate any tissue other than the fascia as the source of disease. Despite this, the role of the skin has assumed greater importance in recent years. Hueston goes as far as to suggest that the skin may be a mediating neurovascular organ. This is supported by the work of Hoopes (1977) who have shown differing enzymatic activity in the dermis overlying nodules and bands than in that

overlying normal fascia. The absence of recurrence when the diseased skin is resected and replaced would appear to incriminate this organ.

True recurrence after surgery is defined as the appearance of new lesions in an already operated area; whereas extensions are the appearance of lesions outside the operated area where previously no disease had been detectable. False recurrence may be due to scar contracture, joint contracture and extrinsic tendon imbalance.

The rate of recurrence following surgery may be as high as 50% (Table 1). Hueston (1963) has shown this recurrence to be early (87% within two years), and in many cases apparent within six to nine months of operation. Young patients with a strong Dupuytren's diathesis, which is suggested by the rate of progress and the presence of predisposing factors such as epilepsy, diabetes or alcoholism, a strong family history and ectopic deposits, exhibit a higher rate of recurrence. The little finger is the most likely to suffer.

TABLE 1
Rates of recurrence

		Patients	Recurrence %	Extension %
1963	Hueston	224	28	25
1957	Gordon	78	27	18
1978	Rank & Chang	50	35	45
1966	Hakstian	51	50	48
1971	Honner, Lamb and James	108	41	20

That recurrence after surgical excision of Dupuytren's contracture is reduced or eliminated by replacing the local overlying skin with a skin graft from another area, was suggested by Piulachs in 1952. Subsequently Gordon (1964), Hueston (1962 and 1969) and Gonzales (1973), reported studies of fasciectomy and skin

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replacement with no recurrence. Hueston (1974), described four circumstances in which skin replacement may need to be considered:

- (a) Longitudinal skin shortage following correction of flexion deformity.
- (b) For recurrent contracture when the skin is densely involved.
- (c) Skin devitalised during surgery.
- (d) As a primary procedure in young patients with a strong Dupuytren's diathesis. These must be highly selected cases.

This study reviews the surgical experience of the Derby Hand Unit and describes the results achieved with the use of full-thickness skin grafts (Wolfe grafts).

Materials and Methods

Two hundred and twenty-nine operations were performed on one hundred and sixty-three patients between January 1975 and September 1981. Thirty-six further operations performed for patients over the age of seventy at the time of operation have been discarded because of difficulty in follow-up of this age group. It was possible to review one hundred (one hundred and fifty-four operations) of the one hundred and sixty-three patients. The follow-up period was from nine months to ninety months, with an average of 37.7 months. The one hundred patients were divided into four groups:

- Group A: Males treated by fasciectomy only.
- Group B: Females treated by fasciectomy only.
- Group C: Males treated by primary Wolfe grafts.
- Group D: Males treated by secondary Wolfe grafts.

When the skin was excised along with a recurrence of Dupuytren's contracture, the term 'secondary' graft has been used. When the skin was excised at the first operation, after a prognostic estimation that recurrence was very likely, this has been termed a 'primary' graft. No Wolfe grafts were performed for disease in females. Seven patients in Group A and one patient in Group B were operated upon for recurrent disease. Twenty-six patients had more than one operation within the same anatomical region during the review period. Only the result of the last procedure could be assessed in each patient, so that the total number of operations was one hundred and twenty-eight. The number in each group and the average age at operation are summarised in Table 2.

The following criteria were used to assess the result of surgery and the function of the hand:—

- (a) Evidence of recurrence. In Groups C and D recurrence can possibly occur either under the graft,

or outside the graft but still within the operated area.

- (b) Evidence of extension of the disease.
- (c) Improvement in flexion contracture—
Loss of extension was documented pre-operatively by adding together the extension loss at each joint of the finger. Thus a straight finger is documented as E(0,0,0) and has a total extension loss of zero. A finger with a 90° flexion deformity at the metacarpo-phalangeal joint, a 45° deformity at the proximal interphalangeal joint, and no deformity at the distal interphalangeal joint is documented as E(-90, -45,0). Total extension loss is 135°. Hyperextension at the metacarpo-phalangeal joint decreases the total extension loss. Post-operative loss of extension was similarly measured and the improvement represented as a percentage of the original deformity.
- (d) The distance of the finger-nail from the distal palmar crease. Where possible this value was compared with that obtained from the non-operated finger of the other hand.
- (e) Two point discrimination: measured longitudinally on the proximal phalanx of the operated finger. Where possible a comparison value was obtained from the corresponding finger of the other hand.
- (f) The ability to distinguish between sharp and blunt sensibility within the operated area.
- (g) Average time (in weeks) of return to work.
- (h) Average time (in weeks) of return to full activity.
- (i) Groups C and D: The presence of tenderness associated with the graft. Breakdown of the skin. Whether the patient believed the quality of the skin grafted to be too coarse or too soft.

All patients were questioned as to their ability to perform everyday tasks associated with job, gardening and hobbies, and housework in the case of females.

TABLE 2
GROUP A: Male fasciectomies. GROUP B: Female fasciectomies.
GROUP C: Primary Wolfe Grafts. GROUP D: Secondary Wolfe Grafts.

	<i>Group A</i>	<i>Group B</i>	<i>Group C</i>	<i>Group D</i>
Number of operations	74	13	15	26
Average age at operation (years)	58	66	48	49
Follow up (months)				
Range	9-87	11-86	12-72	10-89
Average	37	37	31	43

Surgical procedure used for skin replacement

Collections of fluid lift off the graft. It is important to avoid accumulation of synovial fluid and blood under the graft. In this context fatty tissue is also considered to be a fluid collection.



Fig. 1 Contracture before fasciectomy and skin replacement.



Fig. 2 Fasciectomy prior to skin excision.

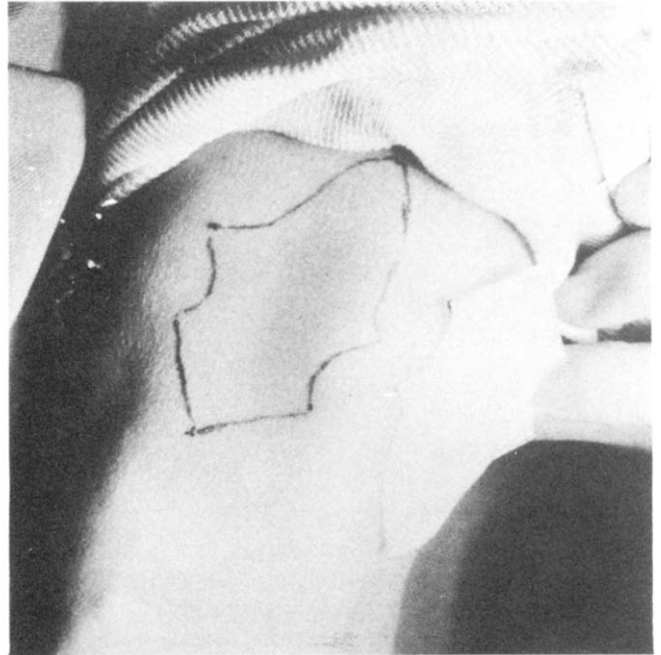


Fig. 3 A pattern is used to take the graft from the upper arm.

- (a) More than usual care should be taken to retain the fibrous sheath of the flexor tendons. Should the flexor tendons become exposed, the problem of skin cover becomes immensely more complex. The fasciectomy is performed before skin excision to ensure that the sheath remains intact. (Figs. 1 and 2).
- (b) The graft is taken from the upper arm using a pattern to cut the graft size and shape. Figure 3. The grafted area extends to the mid-axial lines of the finger and incorporates darts which extend dorsally beyond the mid-axial line at joint creases. Figures 4 and 5. This avoids skin contraction along the graft border.
- (c) The graft is defatted.
- (d) The tourniquet is removed and haemostasis achieved with bipolar diathermy prior to suture of the graft.
- (e) Holes may be cut in the graft to avoid haematoma. This is no longer a routine procedure.
- (f) A tie-over pack is applied.
- (g) A volar plaster slab is worn for one week post-operatively.
- (h) The finger is mobilised at one week.
- (i) The sutures are removed at fourteen days.

Results

Recurrence: The overall rate of recurrence was 46.5%. This high figure is similar to that found by Hakstian (1966) and Honner (1971). The rate of recurrence in each group is documented in Table 3. Interestingly, a smaller percentage of females were affected by recurrent disease. Recurrence rates of 33% in Group C and 42% in Group D refer to recurrence of disease outside the grafted area.

TABLE 3
Rates of recurrence (%)
Overall Rate 46.5%

Group A	Group B	Group C	Group D
54%	25%	33%	42%
		(outside graft)	(outside graft)

Two patients in Group C (13%) and one patient in Group D (4%) were thought clinically to have possible recurrences under grafts. These were not proven. The small % recurrence under the graft is compared with the high % recurrence in non-grafted areas.

This was mainly in the form of nodules in the palm proximal to the graft or along the edges of the graft. Palmar nodules did not contribute to recurrent flexion contracture.

Two patients in Group C were considered clinically to have possible recurrences under the graft.

Extension of the disease: The overall rate of extension was 28.3% which is consistent with the findings of the authors named in Table 1. The rate of extension in each group is documented in Table 4, and is similar within these groups. It is not surprising that Group C provides the highest extension rate (40%). These patients with a strong Dupuytren's diathesis have been operated on at an earlier age (average forty-eight years) and by definition have greater susceptibility to the disease.

TABLE 4
Rates of extension (%)

Group A	Group B	Group C	Group D
28%	25%	40%	23%

Improvement in flexion contracture: At review all groups retained a greater than 50% improvement in deformity. Table 5. The improvement was greatest in females, corresponding to the decreased rate of recurrence in this group. The smaller improvement (51.9%) in those having a primary Wolfe graft results from the higher number of proximal interphalangeal joint contractures present in this group. Thus the average percentage improvement reflects the inability to correct the deformity fully at operation; and not a recurrence of deformity.

TABLE 5
Improvement in total extension loss (TEL)

	Group A	Group B	Group C	Group D	Groups C & D
Pre-op TEL (degrees)					
Range	15-170	15-140	15-130	15-120	15-130
Average	70	78	70	57	62
Post-op TEL (degrees)					
Range	+5-170	0-70	+25-120	+5-70	+25-120
Average	29	26	34	22	26
% Improvement	58%	66%	52%	62%	57%

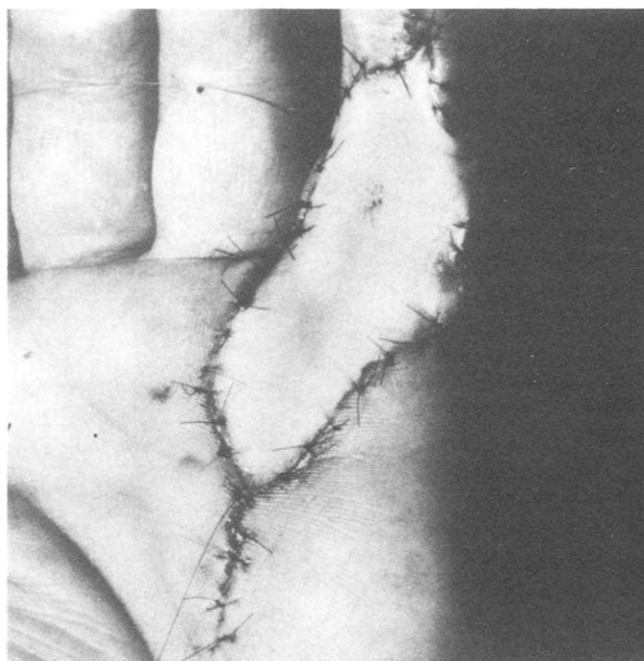


Fig. 4 The graft in place.

Seven patients in Group A had a greater extension loss than preoperatively due to disease recurrence. No females had increased extension loss.

Two patients in Group C had increased extension loss. These with recurrent disease within the graft. Two patients in Group D exhibited greater extension loss at review than was present pre-operatively. One of these was due to skin contraction and has not progressed. The other was due to recurrent disease outside the graft on the ulnar side of the little finger affecting the proximal interphalangeal joint.

The distance of the finger nail from the distal palmar crease: This measurement is a simple means of objectively describing the ability to flex the finger into the palm. It is a valid measurement because it refers to the function of grasp; and it is used in this context to describe the mobility regained after operation.

The average achievement of the grafted fingers was 1.5 cm from the distal palmar crease. This compared favourably with the 1.54 cm average of Group A. The female group achieved slightly better flexion than the male group, Table 6. Three patients in Group A, two in Group B, and five in those with grafts had a measurement of 4 cm or more.

Two-Point Discrimination: The average two-point discrimination distance on the volar surface of the proximal phalanx was similar in males and females

TABLE 6
Distance of finger nail from distal palmar crease (DPC) in cm.

	Group A	Group B	Groups C & D
Operated finger			
Range	0-9	0-6	0-5
Average	1.54	1.2	1.5
Non-operated finger of other hand			
Range	0-3.5	0-2	0-2.5
Average	0.8	0.6	0.6

TABLE 7
Two point discrimination distance (TPD) in mm. on volar surface of proximal phalanx

	Group A	Group B	Groups C & D
TPD Operated finger			
Range	7-25	7-20	16-35
Average	14	15	25

In 17 grafts
TPD could not
be discerned.

TPD in corresponding non-operated finger of the other hand averaged less than 10 mm in all groups.

following fasciectomy. The grafted fingers behaved differently as expected. Table 7. In seventeen of forty-one grafted fingers, two-point discrimination was not discernible within the graft. The average in the remaining patients was 24.6 mm with a range from 16 mm to 35 mm. This compared with a value of less than 10 mm in the corresponding non-operated finger of the other hand. Interestingly, no patient complained of lack of sensibility. Some did say, when questioned, that the graft 'felt a little different'. None related loss of function to loss of sensibility.

Sharp/blunt discrimination: This confirmed the decrease in sensibility of those with a graft. Less than half could distinguish between a reasonably heavy-handed assault with a sharp and a blunt probe. Nearly all of those treated with fasciectomy felt the difference, although many had decreased sensibility on the scar line itself.

Average time of return to work: This was greater in the graft patients as expected. The male fasciectomy patients returned to work at an average of five weeks, range one to twelve. Groups C and D returned to work at an average of 8.5 weeks, range one to twenty-four.

Average time of return to full activity: Groups A and B claimed an average return to full activity of just over 7.5 weeks. Groups C and D averaged 11.8 weeks. These figures of return to work and full activity are tabulated in Table 8, but give no indication of the type of work to which the patient returned. All male patients were classified into three groups: heavy manual workers,

TABLE 8
Average time of return to work.
Average time of return to full activity (weeks).

	Group A	Group B	Groups C & D
Return to work (weeks)			
Range	1-12	Not	1-24
Average	5	Applicable	8.5
Return to full activity (weeks)			
Range	3-16	3-24	4-24
Average	7.6	7.9	11.8

light manual workers, and clerical workers. Table 9 demonstrates that the heavy manual group took longer to return to work and longer to reach full activity than the light manual group. This latter group took longer on both counts than the clerical group. The pattern was similar for those patients having grafts to those having fasciectomy.

TABLE 9
Return to work and full activity according to job description

	GROUP A		GROUPS C & D	
	Return to work (weeks)	Full activity	Return to work (weeks)	Full activity
H.M.	8.5	9.4	8.9	11.7
L.M.	5.7	7.5	7.3	11.8
C.	3.8	5.1	5.7	10.9

Heavy Manual Worker H.M.
Light Manual Worker L.M.
Clerical Worker C.

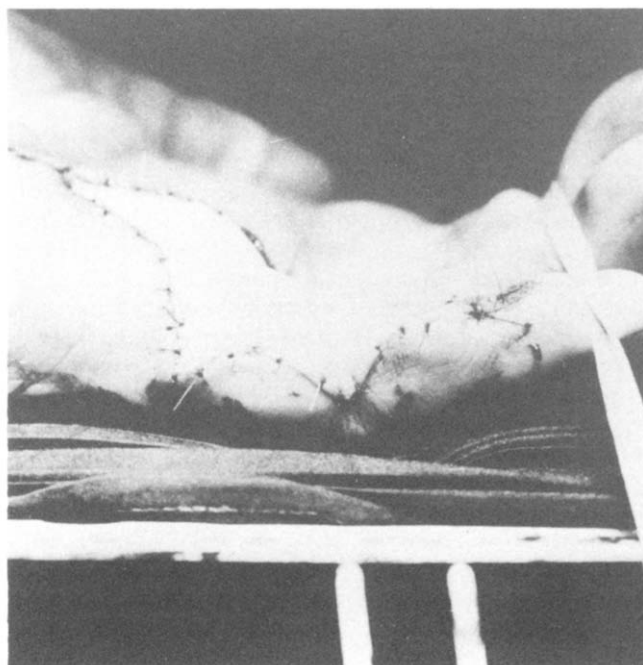


Fig. 5 The graft in place (lateral view).

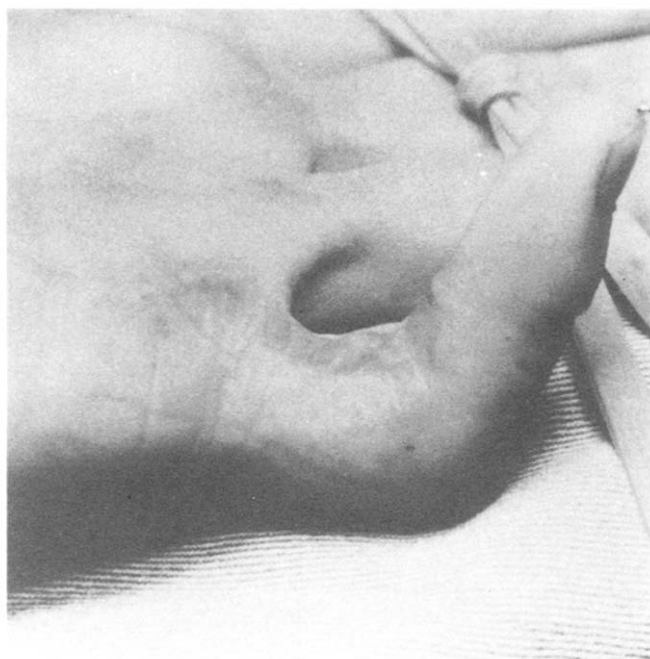


Fig. 6 Recurrence of deformity following skin graft which occurred later in this case.

Quality of the graft: Eight patients stated that they had some tenderness within the graft. Six of these felt that the skin was too soft, and two that the skin was too coarse. Six of these eight patients suffered from occasional breakdown of the skin, either along the border of or within the graft. However, of the thirty-five patients having forty-one grafts only two were dissatisfied with the overall graft quality.

Cold sensitivity necessitated change to an indoor job for one previously heavy manual worker. One patient had a tender lump in the radial border of the graft. This was believed to be due to incorporation of the digital nerve in scar tissue.

Two patients were unhappy with the cosmetic appearance, but were satisfied with the function.

Complications

It is not the purpose of this paper to discuss the well known complications following fasciectomy of the hand. However, the complications resulting from the replacement of skin with a full-thickness graft are pertinent to the assessment of this approach to Dupuytren's disease. Failure of the graft to take is the major problem. Only two patients suffered from partial loss of graft. The first required a split skin graft one month post-operation because of failure to take of the distal one-third. Subsequently the quality of the graft was good. Subjectively the patient felt that the sensibility of the skin was normal but in fact there was

no two-point discrimination within the graft. The patient returned to light manual work eight weeks post-operatively and to full activity in fourteen weeks. The second patient required a split skin graft to a 40% loss of the original graft. He returned to work and full activity in ten weeks and had no problem with the skin quality.

The second complication is skin contraction within the graft. Five patients suffered this problem. One was secondary to the loss of a portion of the tendon sheath. The skin became adherent to the peritendinous tissue centrally but is causing no problem. A second patient had skin contraction along the medial border of the graft resulting in occasional tenderness and breakdown. No further operation has been necessary.

Three patients required further operation because of skin contraction.

Discussion

This study confirms the high rate of disease recurrence following fasciectomy. Dupuytren's contracture is a progressive disease for which surgery offers a means of control but is not curative. The young patient with a strong Dupuytren's diathesis is likely to be faced with multiple operations and considerable disability as the result of recurrent disease. If dermofasciectomy (Hueston, 1982) prevents recurrence, the surgeon is in a better position to control the disease. This is of great benefit if the function of the hand is not decreased either by surgical complications resulting from skin replacement, or by poor quality of the replaced skin.

The basic nature of the pathological process and the role of the skin remain controversial. Recurrence may be due to inadequate primary removal of all histological foci of Dupuytren's tissue, but this does not clarify the method of progress from a microscopic focus to massive recurrent nodules. In forty-one cases in which the skin was excised there was no such recurrence. Excising the skin may increase the ability to remove more of the diseased tissue. Indeed it is often impossible to dissect the skin free from all disease and maintain viable flaps. However the absence of significant recurrence under a graft, despite proliferative recurrence beyond the grafted area, suggests that the skin exerts some control on the disease process as suggested by Hueston, and is not just secondarily involved.

Three patients have been documented, in which clinically it was believed that Dupuytren's tissue had recurred under the graft. This has not been previously reported. However in all three, the tissue did not demonstrate the aggressive nature apparent in recurrent tissue beyond the graft. Histological examination of one

clinically suspected recurrence did not reveal any Dupuytren's tissue. In many other patients grafted, proliferative recurrence was obvious beyond the graft with no disease detectable under the graft.

It should be noted that Hueston has drawn a distinction between true recurrence and extension, within the little finger. He describes as extension the subsequent appearance of an ulnar band not present at excision of a central or radial band. This ulnar band may arise at the insertion of abductor digiti minimi. It has been the experience of the authors that, when dealing with proliferative disease in the little finger, it is not always possible to make this distinction. We have documented any appearance of disease within the operated area as recurrence. This results in our recurrence rate being a little higher than that of Hueston. However as all patients have been assessed using the same criteria, whether they were grafted or not, comparison between the two groups remains valid.

The second aim of this study was to assess the function of the hand following skin replacement. Full thickness skin replacement does not provide the patient with normal skin sensibility as measured by the objective tests of two-point discrimination and sharp/blunt touch differentiation. However, these tests bear little relation to the function of the hand. The mobility of the finger as determined by the ability to flex to the distal palmar crease, and the improvement in extension, is retained. Time lost from work and return to full activity is only marginally longer than in those treated by fasciectomy alone.

Adherence to the surgical principle of avoiding fluid accumulation under the graft, and strict observation of the technique described, have kept the complication rate low. The functional result was not jeopardised in the cases having partial loss of the graft in the post-operative period, or subsequent skin contraction. In fact we believe that in many cases the size of the graft should have been larger to combat both skin contraction and recurrence along its border.

Conclusion

Skin excision and replacement following fasciectomy prevents any appreciable, if not all, recurrence of Dupuytren's tissue.

The function of the hand is not jeopardised by skin replacement.

This surgical approach is advised as a prophylactic measure in certain young patients with a strong Dupuytren's diathesis, and in patients with recurrent disease when the skin is densely involved.

The authors support the belief that the dermis exerts some form of control on the disease process.

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