

LIMITED FASCIECTOMY FOR DUPUYTREN'S CONTRACTURE

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The surgery of Dupuytren's contracture has gained a reputation for technical difficulty and unsatisfactory results which is unique for such a benign and common condition. This notoriety has largely arisen from the complications of surgery. The currently accepted operation has been designed as a prophylactic excision of the whole palmar fascia and involves a radical dissection of the palm and dissections of any involved fingers. Most of the complications of this operation are referable to the extensive palmar wound, rather than the digital dissections, and, in particular, to the radical extent of the palmar clearance which is usually claimed to be a "total" fasciectomy. At the opposite extreme from this radical fasciectomy advocated by Skoog,¹ Shaw² and McIndoe and Beare³ is the very localized excision of Luck⁴ which is little more than a "nodulectomy." Between these extremes is the limited fasciectomy advocated by Hamlin.⁵ It is the object of this paper to report experience with a similar method of limited palmar dissection confined to the affected area with a narrow margin of uninvolved aponeurosis, continuous with finger dissections as they may be required. This is not an attempt to cover the whole treatment of Dupuytren's contracture but rather an appraisal of one aspect of its surgery, namely, the extent of dissection required.

The early postoperative results of limited fasciectomy are presented with an analysis of 96 consecutive operations of this kind performed personally in the past 5 years. A comparison of the long term results of limited fasciectomy and radical fasciectomy is also presented from an examination of 70 hands operated upon between 5 and 15 years previously (by the two senior plastic surgeons with whom the author has been in training) and in which an equal number of hands had been treated by the limited and the radical techniques. These early and late results are used in an assessment of limited fasciectomy for patients with Dupuytren's contracture. It will be shown that the concept of a radical prophylactic clearance of the palm requires revision in view of the results of surgery and the natural history of the disease.

OPERATIVE TECHNIQUE

Limited fasciectomy is the excision of the palpably thickened fascia with a narrow margin of normal aponeurosis. The technique used is based on the direct exposure of individual bands or nodules and allows scope for some initiative in the design of incisions. A direct approach is favored wherever possible. Extensive undermining of palmar flaps and dissection beneath skin bridges are avoided wherever possible by placing incisions directly over the involved areas. Frequently these incisions have to be placed longitudinally and across flexure

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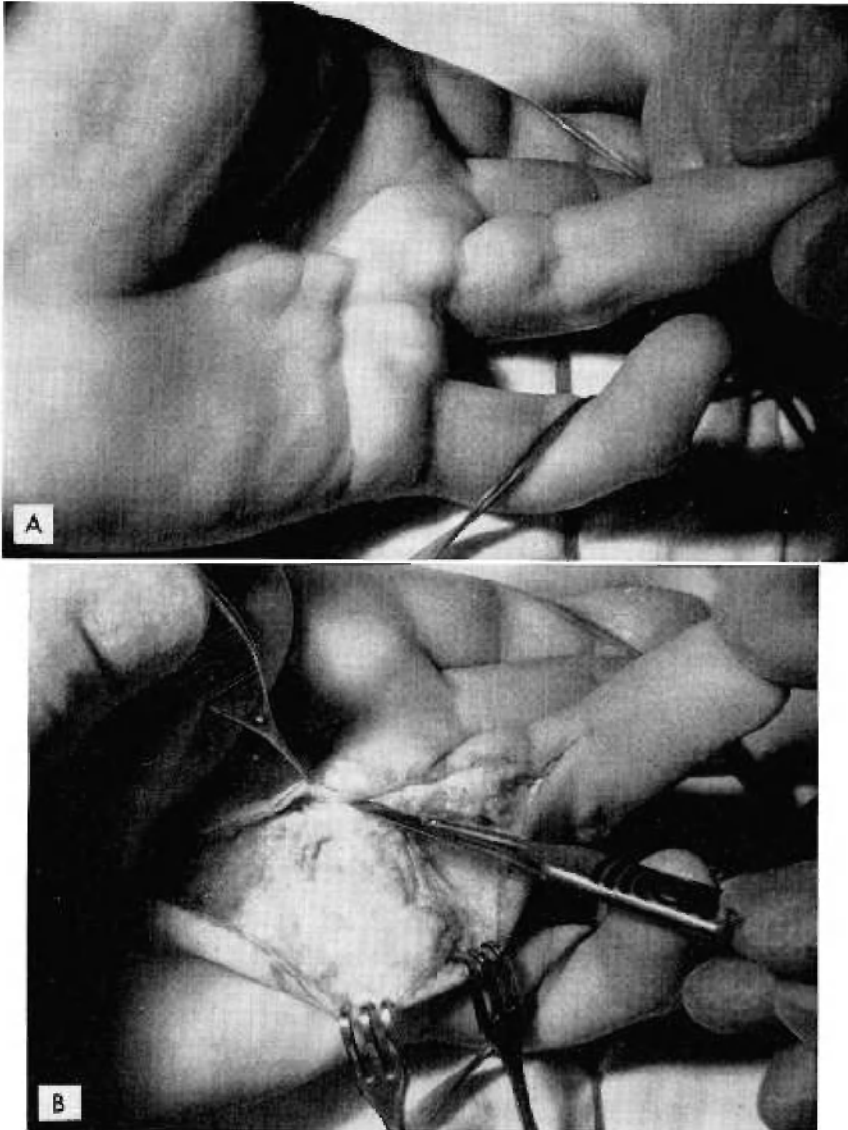


FIG. 1. *A.* Hand extended on a stand allowing access to the prominent band running to the ring finger.

FIG. 1. *B.* Definition of the deep aspect of the dermis allows elevation of skin flaps preserving the dermal circulation intact.

lines, but the free use of Z-plasties has prevented later scar contracture. Any incision may be chosen, provided the means for skin rearrangement to avoid scar contracture are carried out.

Although surgery is usually deferred in the case with a simple nodule confined to the palm without finger flexion, some patients have painful symptoms re-

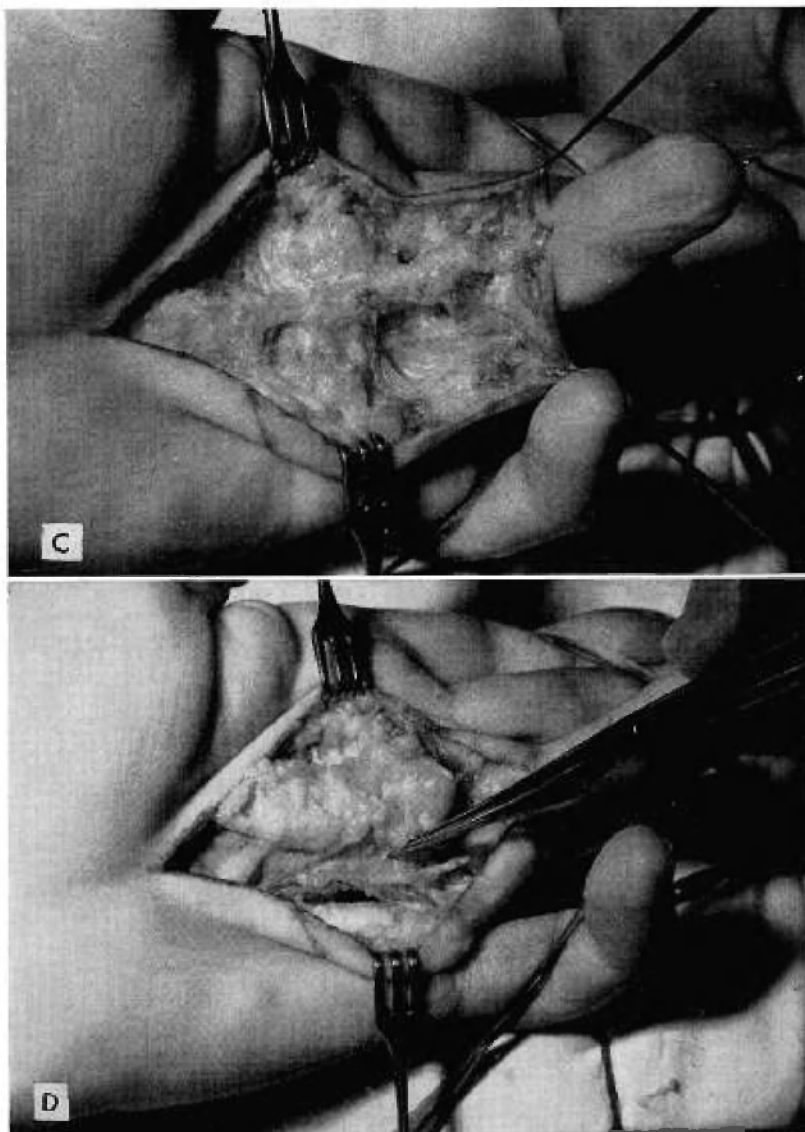


FIG. 1. *C.* The exposure in a limited fasciectomy for a single band
FIG. 1. *D.* Demonstration of the neurovascular bundles and the paratendinous septa

quiring treatment and here the exposure of a transverse incision over the nodule is adequate to allow its excision with a margin of normal aponeurosis. By the same token, a diffuse involvement of the whole palm dictates a clearance of the whole palmar aponeurosis with the radical operation described by Skoog¹ and Shaw.² In the present series this extensive clearance has been reserved only for those cases with diffusely distributed palmar changes.

It is in the patient with the common clinical picture of one or two palmar

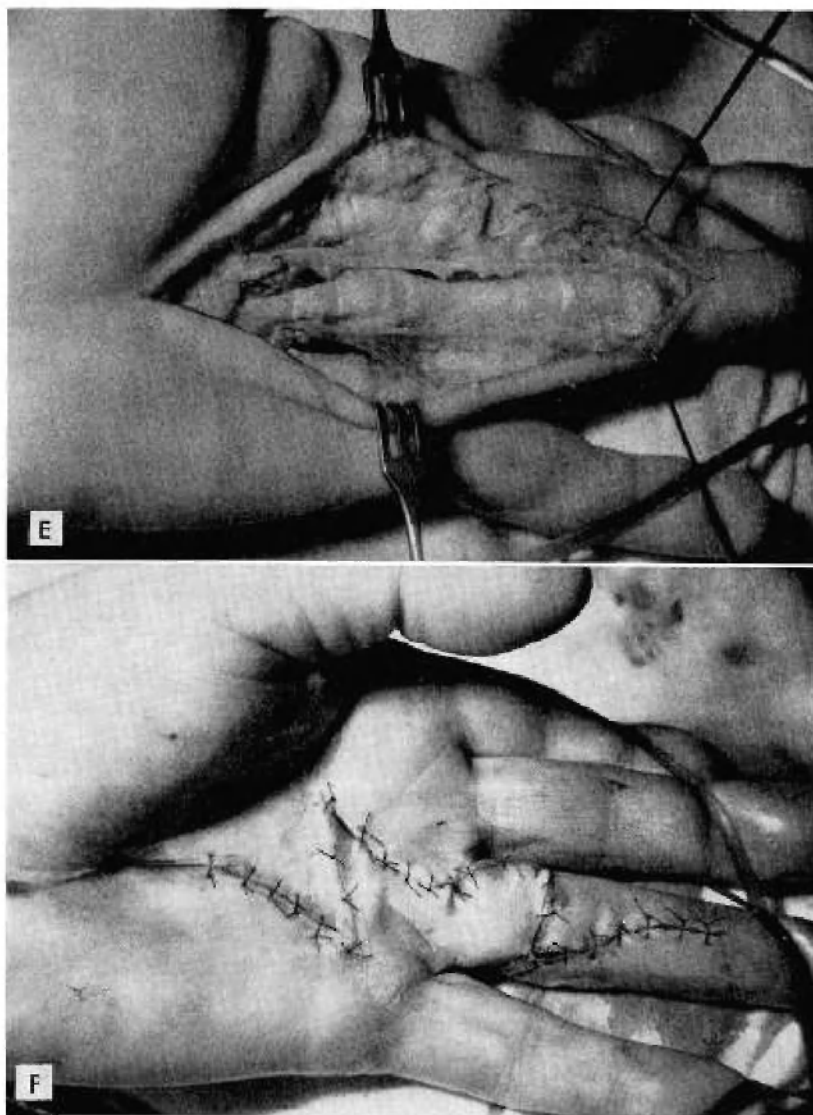


FIG. 1. *E*. The cleared field after fasciectomy for a single band, extending over the tendon sheath on each side.

FIG. 1. *F*. Wound closure with skin elongation by two Z-plastics; after release of tourniquet.

bands producing flexion deformity that the technique using longitudinal incisions with Z-plastics offers the dual advantages of direct exposure and liberal skin lengthening. This is the approach which has been most used in the present series where only the locally involved region of palmar fascia has been excised.

With the use of brachial plexus block anesthesia and an avascular field, the hand is held by rubbers on a padded hand-stand (fig. 1*A*). A longitudinal incision

is made along the most prominent band and the skin flaps elevated after careful definition of the deep aspect of the dermis over the band (fig. 1*B*). Excision of skin because of dermal involvement is an unnecessary sacrifice. A plane of dissection can be produced as illustrated between the dermis and the Dupuytren's tissue without a risk of recurrence in the retained skin. Strict adherence to this plane preserves the dermal circulation so essential for survival of the wound edges and permits their manipulation in local rearrangement. A small

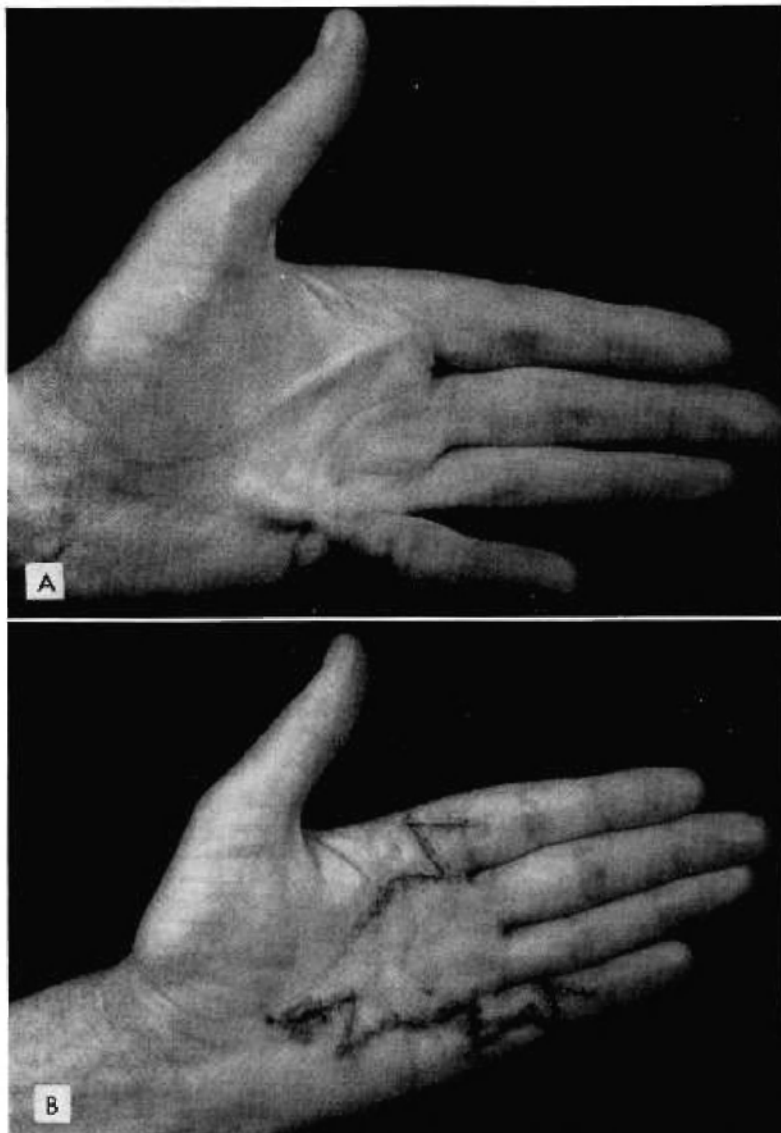


FIG. 2. Discrete bands to index and little fingers with no palpable change in central palm, cleared through separate incisions.

amount of fat is left in the skin flaps which are raised until the limits of the palpably affected area are defined (fig. 1C). The fact that the skin thus elevated has been found to remain free of local recurrence when reviewed after a 15-year period, indicates that the microscopic dermal invasion stressed by Conway⁶ is mainly of academic interest.

Clearance of the involved fascia is begun proximally because division of this end of the band allows some straightening of the finger and improved access to the operative field. The superficial palmar vascular arch is displayed as the fascia is cleared, and at this level the paratendinous septa and neurovascular bundles

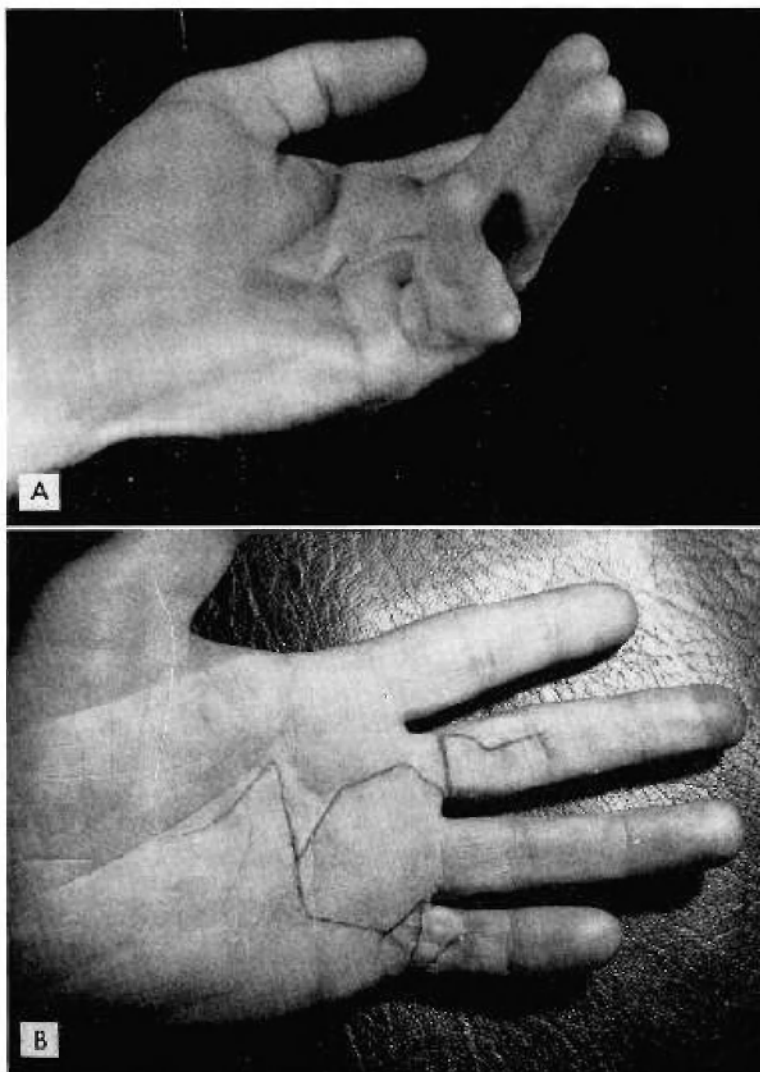


FIG. 3. A complex pattern with major bands to middle and little fingers called for a more elaborate plan of exposure and closure.

are encountered (fig. 1D). The exposure afforded by the longitudinal incision allows excellent demonstration of the neurovascular bundles which may then be dissected down into the fingers in continuity for the whole length of the incision, under direct vision throughout. Displacement of the digital nerve can be recognized and followed so that division of a major digital nerve can be avoided with this exposure. Likewise the tendon sheaths can be dissected cleanly without being opened, thus avoiding a postoperative collection of blood in the synovial sheath with its subsequent inevitable train of adhesions and slow recovery of function.

For a single pretendinous band it is usual to clear over the adjacent two tendon sheaths (fig. 1E). The Z-flaps may be planned at the outset of the operation, but it is unwise to cut the flaps until the tourniquet has been released at the end of the dissection. When the state of the circulation in the wound margins has been assessed, the flaps of the Z rearrangements can be placed with greater safety (fig. 1F).

In the patient with a band forking to another finger, a Y-shaped incision may be used to clear the additional area of palm and to gain continuity of access to the other finger. When two discrete bands are widely separated, two separate exposures are made (fig. 2); but a more complex pattern of palmar change calls for more initiative in the planning of exposure and the closure of incisions (fig. 3).

Brachial plexus block anesthesia has been used routinely throughout this series, and one is impressed by how little bleeding occurs on the release of the



FIG. 4. The digital nerve to the ulnar side of the ring finger is shown running an aberrant course in front of the palmar band and lies immediately beneath the dermis. Adequate, direct exposure has enabled this anomaly to be detected. The nerve in this position is in danger of division during dissection beneath a bridge flap and certainly by subcutaneous fasciotomy!

tourniquet. However, a twisted silkworm gut drain, laid along the wound and brought out at its proximal extremity, is used as a safety precaution. After careful application of a custom-made gauze dressing and crepe bandage pressure, a volar plaster slab is applied with the hand in the position of rest. The patient is kept in bed for 2 days with the hand elevated and then allowed up with the arm in a sling. In the absence of any pain, the dressings are left undisturbed for one week, the hand being completely immobilized for this period. After 1 week the drain is removed, the plaster slab discarded and a minimal dressing applied to allow full use of the operated fingers. No physiotherapy is instituted apart from active use of the hand after the first week and this under the personal supervision of the surgeon.

Two technical advantages attending the use of this direct surgical exposure are worthy of note. It provides greater safety in the exposure of an aberrant digital nerve trunk (fig. 4). It also provides ready access to the discretely involved areas such as a band in the first web space or the ulnar-sided band of the little finger so often intimately fused with the fascia and tendon of *abductor digiti minimi* (fig. 5). Those patients presenting with flexion deformity due to Dupuytren's tissue confined to the digit are regarded as best served by the local fasciectomy, without palmar clearance (fig. 6).

The shortened operating time for a limited fasciectomy is regarded as a factor in lessening complications. The total operating time for a single band clearance such as that illustrated in figures 1A to 1F is less than 1 hour. The tourniquet time is usually about 30 minutes, so that minimal reactionary swelling results from this short ischemic period.

An analysis of the results obtained with this method of fasciectomy will now

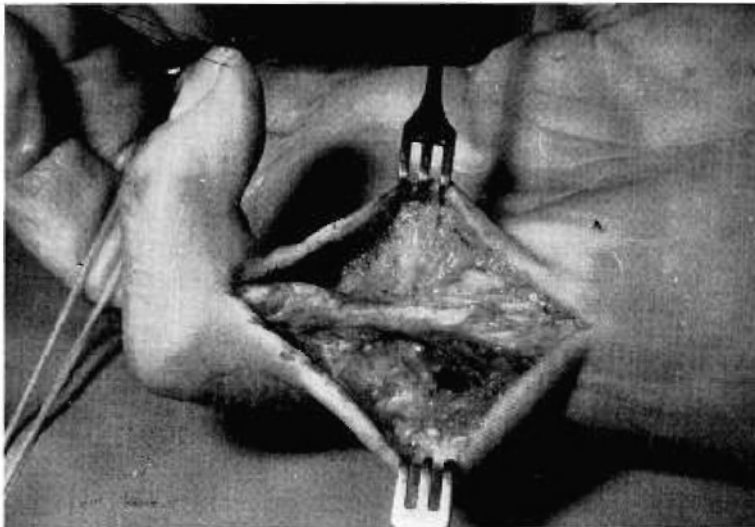


FIG. 5. Direct exposure of a localized "*abductor digiti minimi* band" enables thorough excision of both the band and the tendon of the muscle.

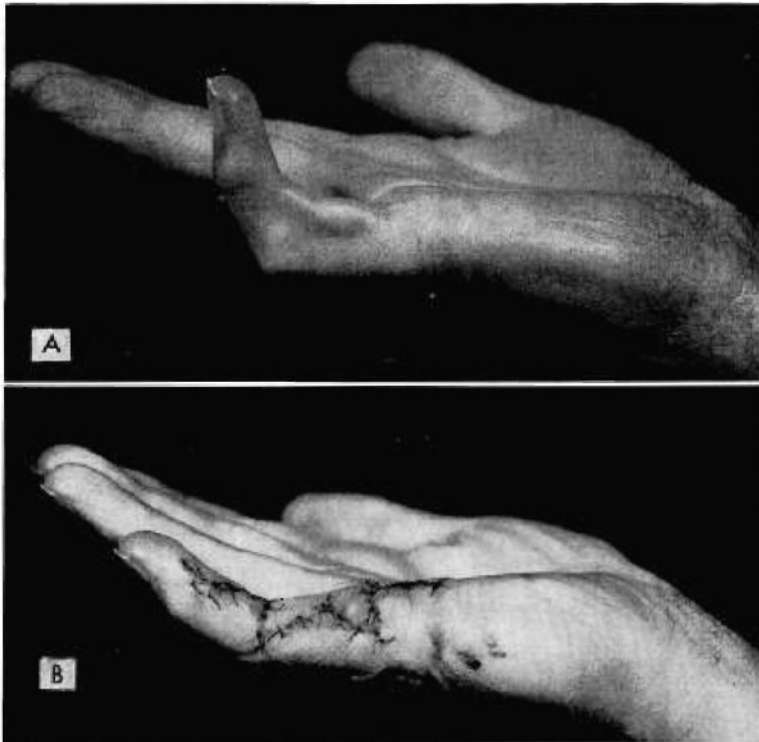


FIG. 6. Dupuytren's contracture confined to the digit does not warrant a palmar dissection. Direct exposure by longitudinal incision and closure with double Z-plastic.

be presented. The degree of postoperative functional disability and the late results on the disease process itself are evaluated.

EARLY RESULTS OF FASCIECTOMY

In a series of 126 operations for Dupuytren's contracture performed by the writer in 98 male patients, limited fasciectomy as described in this paper was performed on 96 hands (81 patients). When indicated by the diffuse nature of the disease, total fasciectomy, as described by Skoog¹ and Shaw,² was performed on 10 hands. Those patients in whom dissection was confined to only a part of a digit (3 hands) and in whom the primary operation included amputation of one or more digits (17 hands), have been excluded as irrelevant to the discussion.

It is not considered sufficient to assess results as merely "good, fair or poor." The results in the present series have been recorded objectively and enquiry directed to those aspects which have failed to conform to the optimal postoperative course which is attained only when the wound is healed within 2 weeks and full active flexion of the fingers is possible within 4 weeks. Table 1 is a summary of the early postoperative results in this series.

Wound healing. Uneventful first intention healing occurred in 78 per cent of the cases, and in a 14.5 per cent it was delayed 1 week, usually by invagination

TABLE 1

The early results of limited fasciectomy in 96 hands (81 patients)

	No. of Hands	Per Cent
Healing time		
2 weeks.....	75	78
3 weeks.....	14	14.5
Beyond 3 weeks.....	7	7.5
Wound complications		
Wound hematoma.....	7	7.5
Persistent edema.....	15	15.5
Skin necrosis.....	2	2
Primary wound infection.....	1	1
Digital nerve injury.....	2	2
Functional recovery		
3 weeks.....	12	12.5
4 weeks.....	28	29
6 weeks.....	41	43
Beyond 6 weeks.....	15	15.5

of small areas of the heavily cornified palmar skin margins. Healing was complete in 92.5 per cent within 3 weeks.

Of the 7 operations with healing delayed beyond 3 weeks, 6 had a wound hematoma, and in 2 the skin of part of a Z-flap was lost. One of these flaps overlay a palmar hematoma, the other was in a finger which had been cleared previously and in which the skin was scarred and the dermal circulation impaired. Provoked by this case of digital skin necrosis, primary excision of such previously scarred skin from over digital recurrences has been performed on three subsequent occasions with Wolfe graft replacement. This has proved a satisfactory procedure.

Wound hematoma. Seven of this series of limited fasciectomy had a postoperative hematoma. This is less than half the incidence reported after radical fasciectomy by Shaw and Barclay,⁷ and MacFarlane,⁸ indicating that the increased area of dissection in radical fasciectomy creates a greater potential source of hematoma. Another factor is the distribution of the skin incision relative to the field of clearance. With the Z-incisions carried to the margins of the operative field, a greater length of suture line is provided over this field for the escape of blood in the first hours after operation. Tight, and in particular "watertight," suturing of the skin edges after fasciectomy is deprecated, especially if there is any tendency for continued oozing during closure. Sometimes the occasion has arisen when it has been deemed advisable to use only one or two sutures in some parts of the wound to ensure adequate drainage. The placid postoperative course following brachial plexus block anesthesia helps to lessen the likelihood of reactionary hemorrhage.

A hematoma after fasciectomy is disastrous. Its evacuation may allow wound healing to occur within 3 weeks, but whether this occurs or not it has been found that recovery of full flexion has inevitably been delayed beyond 6 weeks.

This limitation of flexion rather than the delayed wound healing is the principal disability from a palmar hematoma.

Persistent edema. Despite postoperative elevation of the limb some degree of edema of the hand is common, but this usually subsides within two weeks. Delayed wound healing may cause persistence of edema up to four weeks and this edema is disabling if it persists beyond six weeks. This occurred in 15 patients (15.5 per cent) in this series of limited fasciectomy. Palmar wound hematoma had occurred in 7 of these hands and provided ample explanation for the edema. However, in 8 hands (5 patients) the wounds had healed within 3 weeks without hematoma and, although showing early promise of good results, edema persisted for 8 to 12 weeks and full restoration of finger flexion occurred only as the edema subsided. A feature of all these patients was an increased vasomotor activity shown in a warm, sweaty hand. In 4 of these patients some degree of hand-shoulder syndrome was considered to be acting. Each of the 3 bilateral cases went through the same edema phase after the second hand was cleared. These and several others of this group had been designated as "the fat men with fat hands" and it is fascinating to read now of Barclay's⁹ more scientific correlation of body build with edema potential. However, this correlation is by no means universal, and persistent edema has been seen in men of all builds, the worst in two men of low endomorphic rating.

Energetic physiotherapy with its methods of applied heat and passive movements, both of which are regarded as likely only to increase and to perpetuate the production of edema fluid, has been rigorously avoided. With encouragement of active hand and shoulder movements these patients all eventually recovered full function.

Digital nerve injury. There appears to be a reluctance to report this complication, Gordon¹⁰ being the only surgeon in whose writings one has found reference to its occurrence. In the present series, division of a digital nerve occurred twice, one at the level of the web space where the nerve was displaced by a band passing to the finger from the region of the metacarpal neck, and the other, while clearing an area of diffuse, immature digital recurrence. In both instances the injury was recognized at the time and repaired at once by fine silk sutures. Recovery of sensation has occurred in each case.

Functional recovery. This is the most important and yet the most difficult assessment of all. To retain an objective measure of this quality, the time was recorded when active flexion of all fingers was regained; that is, their ability to touch the palm firmly. There is no doubt that if finger extension is obtained at the cost of lost flexion, the hand function is impaired rather than improved by the operation. Full finger flexion is the paramount action necessary for resumption of normal activity or occupation and should be regained as early as is consistent with wound healing. For recovery of function after fasciectomy the time limits consistent with a good early result are 3 weeks optimal (fig. 7) and 6 weeks maximal.

In the present series 12 hands (12.5 per cent) had regained full flexion within 3 weeks, 28 hands (29 per cent) within 4 weeks and 41 hands (43 per cent) within

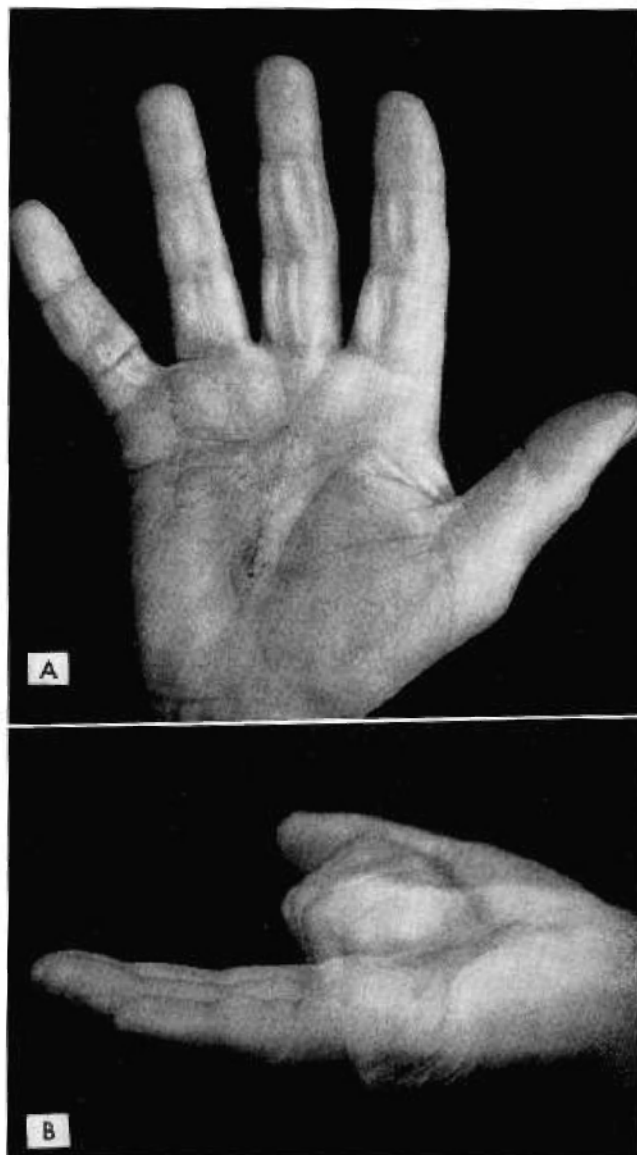


FIG. 7. Eighteen days after limited fasciectomy of the little finger and related palm. Double-exposure photograph shows the range required before functional recovery is classified as present.

6 weeks. Functional recovery sufficient to resume normal occupation was therefore complete in 84.5 per cent of the hands within 6 weeks.

The delay of recovery in many of these patients from 4 to 6 weeks was attributed to the synovial flexor tendon sheaths having been opened at operation. The hemorrhage into the tendon sheath which follows this accident must

inevitably limit tendon excursion until broken down and resorbed. Temporary tendon adhesions from this cause are probably far more common than has been recognized.

In the 15 hands (15.5 per cent) in which full flexion was not regained within 6 weeks, 7 had a wound hematoma and 6 had persistent edema of the hand without hematoma. These patients have already been discussed. Two patients had clinical osteoarthritis of the interphalangeal joints, and in each the little finger had been operated upon and was slow in regaining full flexion. With active exercises and the prohibition of passive physiotherapy, full flexion was regained in all these hands within 12 weeks.

After total fasciectomy in 10 hands, 6 had failed to regain full flexion within 6 weeks, 3 having developed a hematoma and 3, persistent edema. However, all had regained full flexion at the end of 12 weeks.

It is the writer's practice to warn patients undergoing fasciectomy that they will be unable to resume manual work for 6 weeks. As the above figures for local fasciectomy indicate, this forecast has at times been overly optimistic but, in others it has been unduly pessimistic; thus, 2 patients, after fasciectomy of the ring finger and related palm, have resumed bricklaying at the end of 3 weeks. The early resumption of active exercise as soon as the skin wound allows is paramount in obtaining early recovery of function. This series has amply demonstrated the futility, in fact the danger, of passive physiotherapy in the form of applied heat, wax baths and forced movements.

Early functional recovery after limited fasciectomy is attributable to the lesser extent of operation which involves the exposure of fewer tendon sheaths in the palm and is followed by fewer complications of wound healing. The converse is shown in the results of radical fasciectomy as reported by Shaw and Barclay⁷ where 14 per cent required evacuation of palmar hematoma (two-thirds of these requiring secondary skin grafts) and where functional recovery was delayed beyond 12 weeks in a similar number of hands.

Shaw and Barclay⁷ have classified a good result as "a hand healed under a month from operation; the patient returned to his usual occupation within three months with useful function; developing a powerful grip; and showing no recurrence within the field of operation." The standards set in the present series differ in aiming at earlier healing (2 weeks) and earlier functional recovery (4 to 6 weeks) with less emphasis on the recurrence of the disease. This change in the emphasis is justified both by the improved early functional results of limited fasciectomy and by a comparison of the late results of both local and radical fasciectomy found at follow-up.

LATE RESULTS OF FASCIECTOMY

The writer's series of 96 limited fasciectomies extends over less than 5 years with an average of less than 2 years, so that the results may be too recent to be of value. At follow-up, 57 hands were found clear of any Dupuytren's changes (designated "clear"), 27 were clear in the operated area but showed new changes of the disease elsewhere in the hand (designated "extension") and 12 showed

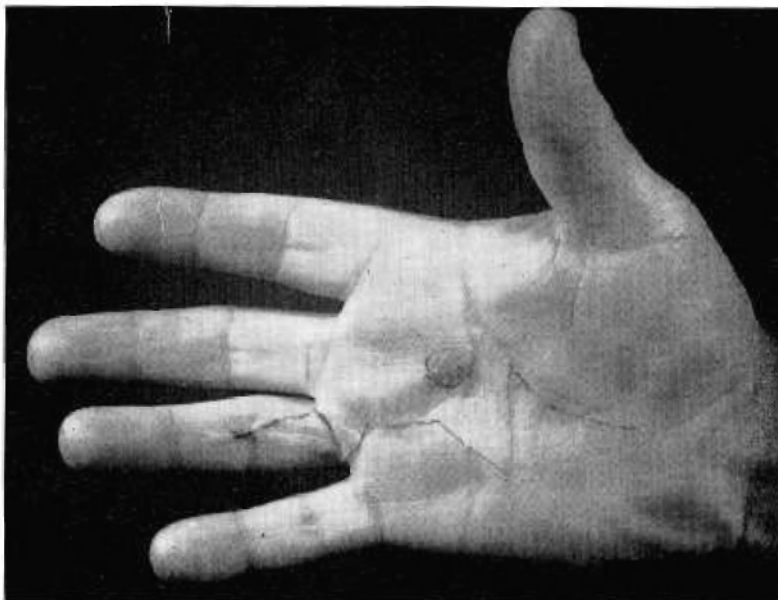


FIG. 8. Two years after limited fasciectomy of the ring finger. A nodule is present in the remaining palmar aponeurosis adjacent to the cleared field. This is typical of many instances of extension of the disease but obviously constitutes no disability.

true recurrence of Dupuytren's tissue within the operated area (designated "recurrence"). Some of these hands also showed extension. Once more the standard used in this assessment requires definition and an example of extension in the palm (fig. 8) is illustrated to show that a recording of extension or recurrence need not imply contracture or disability. The functional insignificance of most extensions and recurrences is shown by the low rate of secondary surgery so far required (table 2).

In table 2 these follow-up groups are broken down to compare the initial degree of contracture and the extent of fasciectomy performed. The initial deformity was more severe in the group showing recurrence. This group was more severe in the group showing recurrence. This group was of a younger average age and with a higher incidence of family history, bilateral disease, knuckle pads and plantar lesions than those which were clear or with only extension (table 4).

Five to fifteen years follow-up. To establish more accurately the late results of fasciectomy, a personal examination was conducted of 78 hands (in 65 patients) operated upon for Dupuytren's contracture between 5 and 15 years previously by two senior hand surgeons with whom the writer is associated. While recognizing that a limited fasciectomy is not of a strictly limited area but may approach a total palmar clearance, and that a radical fasciectomy may have been performed either as a curative or as a prophylactic measure, these hands have been broadly classified as limited and radical fasciectomies according to the extent of palmar dissection. It was found that in 35 hands limited fasciectomy

TABLE 2

The degree of initial contracture and extent of surgery in 96 limited fasciectomy; grouped according to the state of the hand at follow-up

	Clear	Extension	Recurrence
Degree of initial contracture			
Palmar nodule only.....			
Metacarpophalangeal joint flexion.....	29	8	1
Interphalangeal joint flexion.....	28	19	11
Extent of fasciectomy			
1 digit and related palm.....	49	19	5
2 digits and related palm.....	8	8	7
Secondary surgery			
Secondary fasciectomy.....		1	1
Secondary amputation.....			2

had been performed and in 35 total fasciectomy. These two groups of hands have been compared in an attempt to assess the prognosis after each type of operation. The 8 hands which have been excluded as irrelevant were comprised of 6 with simple amputation of the little finger as the primary procedure, and 2 with localized fasciectomy within a digit.

The results of this late follow-up are summarized in table 3. No significant difference is to be found in the late results of surgery by either method. Thus 20 per cent of each group remained completely free of Dupuytren's tissue, 40 per cent of each group showed recurrence within the operated field and 40 per cent, of each group, while remaining free of true recurrence, showed slow progress of the disease with further lesions appearing elsewhere in the hand. The vicious nature of the disease in the group showing recurrence within the operated field is indicated by the high incidence of secondary surgery, comprising 13 secondary fasciectomies of either digit or palm and 11 secondary amputations of the little finger. This confirms the poorer prognosis given by James and Tubiana¹¹ for contracture involving the little finger. The less severe nature of the changes in the 28 hands showing extension (without true recurrence) is indicated by only 11 requiring secondary surgery; 9 secondary fasciectomies and 2 secondary amputations of the little finger.

Table 4 gives the incidence of the general factors related to the Dupuytren's diathesis as found throughout this study of both early and late results of fasciectomy, comprising 139 patients in all. A similar incidence was found in each series and only the combined figures are presented here. Those patients with true recurrence within the operative field were of a younger average age and with a higher incidence of family history, bilateral disease, knuckle pads and plantar lesions. The group with no true recurrence, but extension elsewhere in the hand, occupied an intermediate position between the recurrence group and those patients remaining permanently free of the disease. This applied despite any difference in the extent of operation. It would therefore seem that, at the time of operation, the stimulus to the production of Dupuytren's tissue

TABLE 3

A comparison of the results of fasciectomy (35 limited and 35 radical) performed on 70 hands between 5 and 15 years previously; grouped according to the state of the hand at follow-up

	Clear		Extension		Recurrence	
	Limited	Radical	Limited	Radical	Limited	Radical
No. of hands	7	7	14	14	14	14
Extent of operation						
Palm only		4		11		3
Palm and 1 digit	6	3	12	2	7	6
Palm and 2 digits	1		2	1	7	5
Site of new tissue						
Palm only			1	4		
Digit only			3	2	9	5
Palm and digit			10	8	5	9
Secondary surgery						
Secondary fasciectomy			4	5	8	5
Secondary amputation			1	1	5	6

TABLE 4

The features of the Dupuytren's diathesis found in 139 patients comprising both the early and late series; grouped according to the state of the hand at follow-up

	Clear		Extension		Recurrence	
	No.	%	No.	%	No.	%
No. of patients	63		45		31	
Average age (years)	55		54		45	
Evidence of Diathesis	No.	%	No.	%	No.	%
Family history	8	13	4	9	6	20
Bilateral disease	54	86	43	95	30	98
Knuckle pads	28	45	21	47	20	65
Plantar lesions	4	6	6	13	8	26

had ceased in some patients so that no further abnormal tissue was produced; it had persisted to a moderate degree in other patients so that, although the operated field remained clear, new tissue was laid down in some uncleared areas of the hand; and it persisted strongly in others so that even the macroscopically normal tissue remaining in the cleared areas of the fingers and palm was stimulated to reproduce Dupuytren's tissue in the same area.

A preoperative assessment of the general factors present in any particular patient may give some indication of the intensity with which this stimulus to the production of Dupuytren's tissue is acting. The prognosis is poorer if the patient is young and the change is diffuse, particularly if knuckle pads and plantar lesions are present and with a family history of Dupuytren's contracture.

It is concluded from this study that the late results of surgery in Dupuytren's contracture depend more on the make up of the patient than on the extent of the

fasciectomy. A limited fasciectomy allows correction of deformity and more rapid recovery of hand function without increasing the risk of recurrence.

SUMMARY

The operation of limited fasciectomy using a longitudinal incision with Z-plastic repair is a relatively simpler operation than the classical radical or total fasciectomy.

While providing improved exposure and a means for ample skin lengthening, limited fasciectomy offers a smoother and more rapid return to full functional activity by having less scope for postoperative complications.

Comparison of the long term results of patients who have undergone limited fasciectomy with those who have undergone total fasciectomy has failed to show any difference in the rate of recurrence or extension of the condition.

The most important factor in determining the rate of recurrence or extension is the make up of the patient himself. A patient with a strong Dupuytren's diathesis may form new tissue regardless of the extent of surgery.

Whether the stimulus to the production of Dupuytren's contracture is still acting and, if so, how strongly may be indicated by the presence of knuckle pads, plantar lesions and a strong family history.

It is concluded that the operation of Dupuytren's contracture should aim simply at the correction of the contracture rather than attempt a cure of this general diathesis. Limited fasciectomy would appear to be a logical operation for this condition.

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