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Fasciectomy and Dupuytren's disease: A comparison between the open-palm technique and wound closure

An analysis of 153 patients treated surgically for Dupuytren's disease is presented. One hundred fifteen patients were treated with the closed-palm technique, while 38 patients were treated with the open-palm technique. The groups were comparable in terms of preoperative metacarpophalangeal and proximal interphalangeal joint involvement, as well as the total number of rays involved. The patients were analyzed in terms of average pre- and post-operative total active motion (TAM) in the digital joints. The patients in the closed-palm group had a 10% improvement in TAM surgery, while those in the open-palm group had a 17% improvement ($p < 0.05$). The complication rate in the closed-palm group was 19% and in the open-palm group, 8%. There were no hematomas in the open-palm group and no infections in either group. In a later follow-up of 103 patients who could be contacted, 33 of the 78 closed-palm group showed residual contracture (42%), while five of the 25 open-palm group were similarly affected (20%). (J HAND SURG 9A:53-58, 1984.)

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Since the original description by McCash[1] in 1964, numerous reports have appeared that discuss the use of the open-palm technique in the treatment of Dupuytren's contracture.[2–5] To date, however, no report has appeared of a study comparing the results of the open- versus the closed-palm technique; this study presents such a comparison.

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Material and methods

Between the years 1976 and 1980, 153 patients were treated surgically for Dupuytren's contracture. Excluded from this study were patients who had undergone previous surgery on the involved hand or who had concomitant diseases, such as rheumatoid arthritis or other connective tissue disorders. One hundred fifteen patients were treated by the closed-palm technique, while 38 were treated by the open-palm technique described later in the study. Pre- and postoperative total active motion (TAM) was recorded on all patients. The

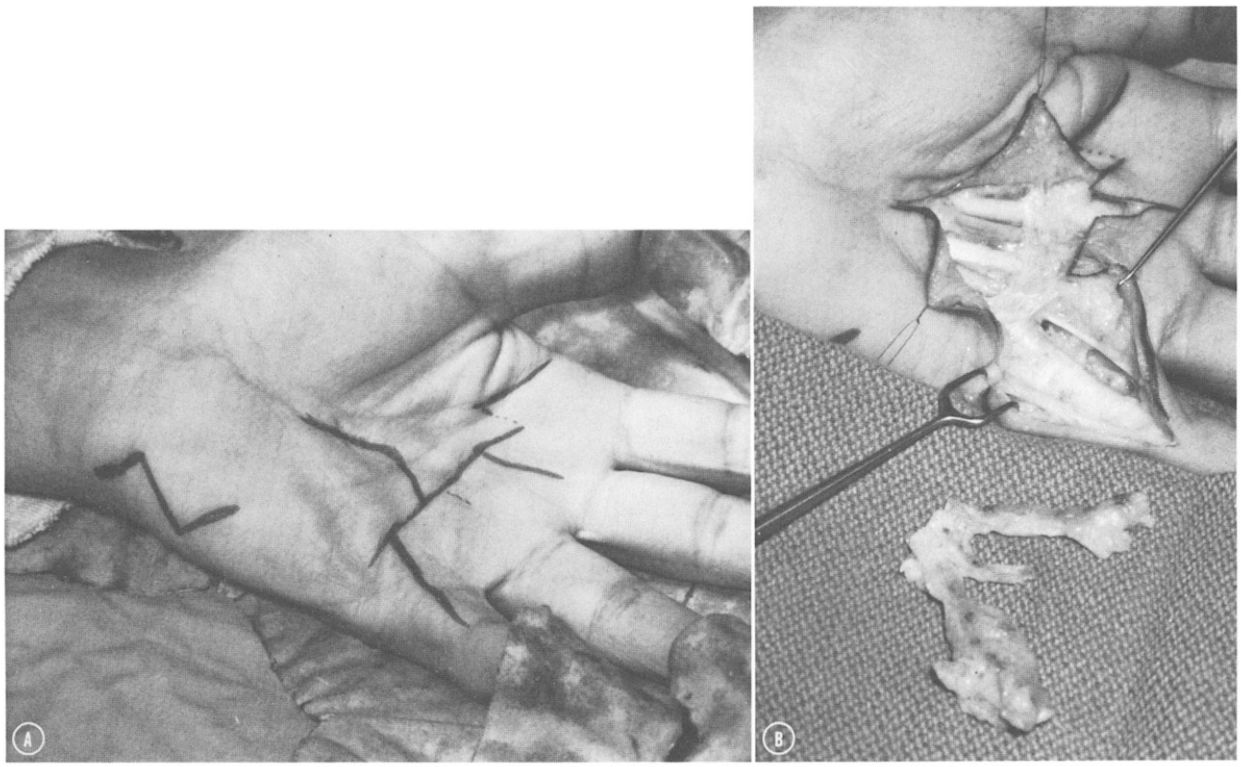

Fig. 1. A, The incision employed in all open-palm cases is shown. It is a modification of the Skoog approach with an incision in the distal palmar crease and longitudinal incisions extending in to the fingers. Where these cross flexion creases, Z-plasties are subsequently incorporated. **B,** Through these incisions, all of the longitudinal fibers and deep bands are excised. The transverse fibers are left in place as recommended by Skoog.

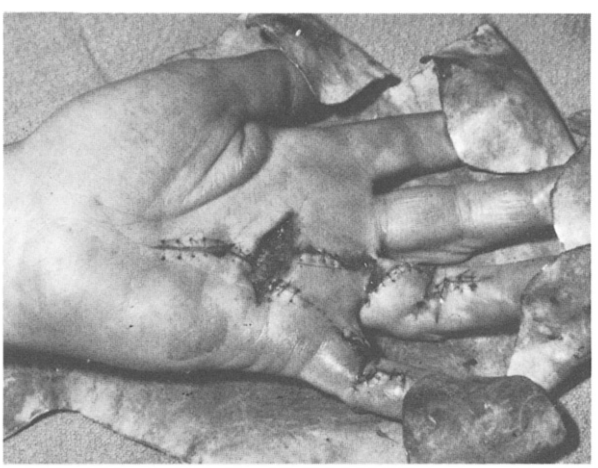

Fig. 2. The transverse incisions at both the distal palmar crease and the transverse limb of the Z-plasty are left open.

open-palm and closed-palm groups were comparable preoperatively in terms of (1) metacarpophalangeal (MP) and proximal interphalangeal (PIP) joint involvement (Table I), (2) the number of rays involved (Table II), and (3) the average TAM (Table III). Follow-up before discharge from care averaged 4 months in the open-palm group and 6 months in the closed-palm group. In addition to a retrospective chart review, one late follow-up interview was conducted.

Operative procedures

Open technique. For lesions involving the palm and fingers, excluding the thumb, the diseased palmar fascia was exposed through a modified Skoog[6] incision, comprising a transverse incision near the distal palmar skin crease and longitudinal incisions extending distally in to the involved digits (Fig. 1). Z-plasties were later incorporated into the longitudinal incisions. All diseased fascia was removed, leaving behind the transverse palmar fibers. The transverse incisions were left open both in the palm and in the digital Z-plasties (Fig. 2). The hands were immobilized in a dorsal splint with a bulky palmar dressing. Once patients had recovered from the anesthetic (axillary or general) they were encouraged to begin active flexion, squeezing the palmar dressing. In 3 to 5 days the splint and dressing were removed and the patients were encouraged to reach full active range of motion (ROM) (Fig. 3). A small dry

Table I. Joint involvement*

Technique	*% of cases with joint involvement*	
	MP	*PIP*
Closed: 131 hands	89	64
Open: 47 hands	87	53

*Percentage of preoperative MP and PIP joint involvement in the open- and closed-wound groups. By chi-square analysis, there were insufficient data to show one group different from the other.

Table II. Percentage of preoperative individual ray involvement*

Technique	*% of involvement by no. of rays*			
	1	*2*	*3*	*4*
Closed: 131 hands	47	34	11	7
Open: 47 hands	40	31	19	9

*By chi-square analysis, data are insufficient to show one group significantly different from the other.

Table III. Percentage of improvement in the closed- versus open-wound group*

Technique	*Average preop. TAM*	*Average postop. TAM*	*% of improvement*
Closed: 229 rays	195°	215°	10
Open: 89 rays	203°	238°	17

*The data were analyzed by Student's t test and are statistically significant at a 95% level of confidence.

dressing was applied to the palmar wound alone. Physical therapy was begun, with patients being encouraged to use the hand for vigorous manual activities, such as raking leaves. In addition, an Orthoplast splint holding the MP and interphalangeal joints in extension was used by all patients at night (Fig. 4). This night splint was better tolerated if the wrist was placed in slight flexion. The patients were seen regularly, and the therapy and splint were continued until they ceased to be beneficial. The open wound healed to an imperceptible, linear scar in all cases, requiring 3 to 4 weeks to achieve closure (Fig. 5).

Closed technique. Patients treated by the closed-palm technique had similar excisions performed, but all wounds were closed after meticulous hemostasis had been obtained. Two thirds of the wounds were drained. A postoperative program of therapy and splinting such as that outlined earlier in the study was employed in these patients also.

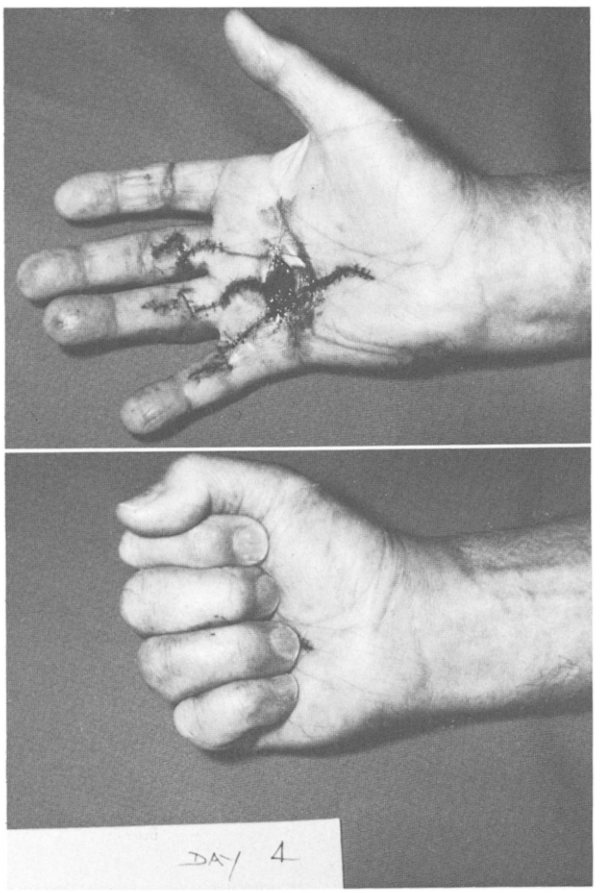

Fig. 3. At a convenient time between 3 and 5 days after surgery, all dressings are removed and a vigorous active ROM is required of the patient.

Table IV. TAM

Technique	*No. improved*	*No. unchanged*	*No. worse*
Closed: 229 rays	153 (66%)	19 (8%)	57 (25%)
Open: 89 rays	74 (83%)	8 (9%)	7 (8%)

Results

Of 115 patients treated by the closed-palm technique, 16 had bilateral treatment, accounting for a total of 131 hands. Of the 38 patients who were treated by the open-palm technique, nine had bilateral treatment, accounting for 47 hands. In order to analyze the involved digits with respect to TAM, the hands were further studied as to individual rays involved. This analysis included digits with pretendinous cord involvement in the palm alone,[7] as well as digits with disease extending from the palmar fascia across the MP and PIP joints.

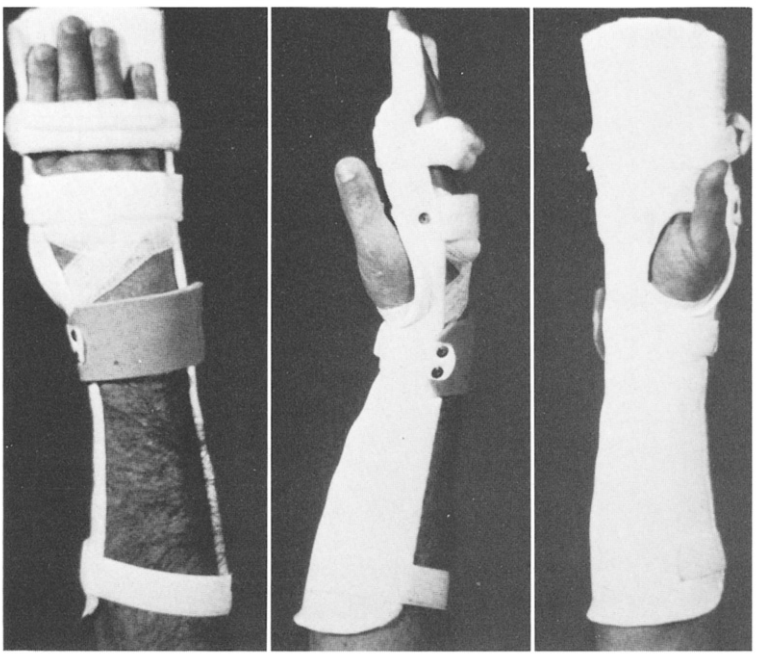

Fig. 4. At the time of the first dressing change, between 3 and 5 days, the patient is provided with a night extension splint. Where appropriate, some "growth" room is allowed below joints that have previously been flexed. In all cases it is found that this splint can be better tolerated if it is slightly flexed at the wrist. This splint is *not* worn in the daytime, during which the patient is encouraged to engage in vigorous manual activity.

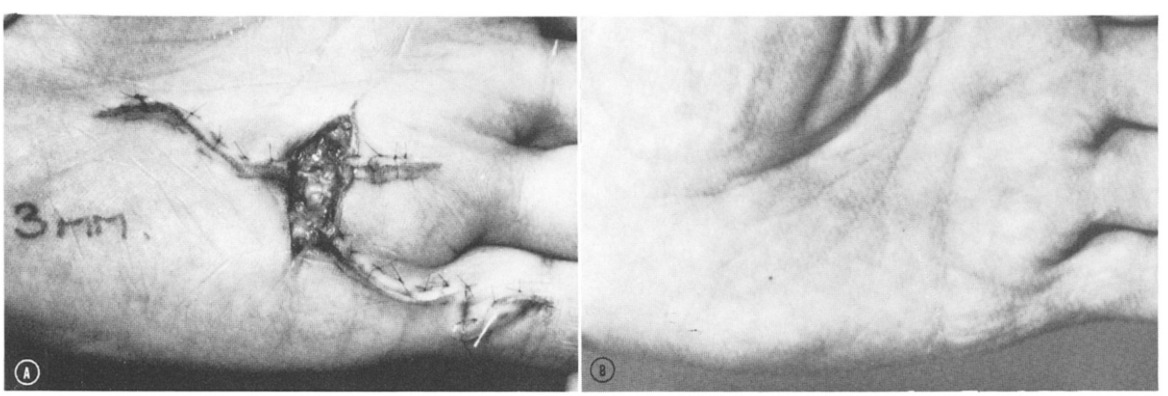

Fig. 5. The healing of an open wound is shown in these two illustrations. The 3 mm marked on the palm in **A** refers to the distance between two marks made on the skin prior to incision. These two marks were 15 mm apart on completion of treatment. They cannot be seen in **B**, but the two marks returned to their original relationship, that is, 3 mm apart. This phenomenon of skin relaxation rather than epithelialization was observed in all cases.

The individual TAM for each involved ray was then analyzed in terms of average pre- and postoperative TAM. In the closed-palm group, a total of 229 rays had an average preoperative TAM of 195° and an average postoperative TAM of 215°, a 10.3% improvement. In the open-palm groups, a total of 89 rays had an average preoperative TAM of 203° and an average postoperative TAM of 238°, 17.2% improvement (Table III).

Considering the involved rays individually, of 229 rays treated by the closed-palm technique, 153 (66%) improved, 19 (8%) remained the same, and 57 (29%) became worse as measured by TAM (Table IV). In the open-palm group consisting of 89 rays, 74 (83%) improved, eight (9%) remained unchanged, and seven (8%) were worse in terms of TAM.

At the final review, 103 patients could be contacted,

Table V. Late review—extension deficit (ED)

Treatment	*Nil*	*Rays showing ED*			*Total with ED*
		0°-30°	*30°-60°*	*60°-90°*	
Closed	181	29	14	5	48 (21%)
Open	84	2	2	1	5 (5.6%)

Nil = rays showing no ED.

Table VI. Complications*

Technique	*Hematoma*	*Sympathetic dystrophy*	*Persistent edema*	*Digital nerve hypesthesia*	*Persistent pain*
Closed: 21 (19%)	4	8	3	4	2
Open: 3 (8%)	0	0	2	1	0

*Complication rate in the closed- versus open-palm group. No cases of hematoma in the open-palm group and no evidence of infection in either group. By chi-square analysis, data were insufficient to show one group different from the other.

78 of the closed-palm group and 25 of the open-palm group. The degree of contracture was determined in all (Table V). Of the 78 patients in the closed-palm group, 45 patients had full extension of 181 rays. Of the 48 contracted rays in the remaining patients, 29 rays had an extension deficit from 0° to 30°, 14 rays from 30° to 60° and five rays from 60° to 90°.

Of the 25 open-palm treated patients, 20 had full extension of 84 rays, while five rays in five patients showed an extension deficit: two from 0° to 30°, two from 30° to 60°, and one from 60° to 90°.

Complications

The complication rate in the closed-palm group was 19% and in the open-palm group 8% (Table VI). Complications in the closed-palm group included four cases of hematoma, eight cases of sympathetic dystrophy, three cases of persistent edema, four cases of digital nerve hypesthesia, and two cases of persistent pain. In the open group, two patients had persistent edema while one patient had digital nerve hypesthesia.

Discussion

The surgical treatment of Dupuytren's disease has varied considerably over the years. The initial enthusiasm for radical fasciectomy as described by McIndoe and Beare[8] has been tempered more recently by Skoog's[6] report of inferior results with radical fasciectomy. It became Skoog's preference to perform a so-called "selective aponeurosectomy," leaving intact the superficial transverse fibers as well as the remaining elements of the palmar fascia that were not involved. Although McCash[1] does not provide a detailed account of the extent of fasciectomy, if one combines Skoog's "selective" approach to the fascia with McCash's "open" technique, satisfactory results can be obtained. It is indeed not far removed from Dupuytren's[9] original work in 1834. Although his procedure was carried out through three separate incisions, they were transverse in orientation, left open to heal, and the hand was splinted postoperatively in extension. Other considerations outlined by McCash, such as the principle of the open palm leaving a dual blood supply for the proximal and distal flaps, improved extension of the MP joints (particularly when combined with Z-plasty), and the ability to close the remainder of the wounds without undue tension, logically account for the improved results when the open-palm technique is used. If PIP joint involvement is present, an appropriate Z-plasty, leaving the transverse limb of the Z open, applies the same principle to that joint and permits increased extension.

The open wound does not close by epithelialization but rather by the gradual "flattening" of the transverse wrinkles in the skin caused by the longitudinal compression exerted by the Dupuytren bands. This can be confirmed by tattooing points on either side of the transverse wound before incision. After fasciectomy the points may be as much as 2.5 cm apart, but they return to their original relationship with wound healing. Clearly, suturing this transverse wound causes pain on attempting full extension until the skin relaxation occurs. (A comparative study between the two techniques in the same patients with bilateral disease was abruptly terminated when one patient threatened suit—only half-jokingly—because of the pain of his second, closed procedure compared with that of his first, open, operation.)

The complication rate in the closed-palm group was twice that in the open-palm group. While no infections

occurred in either group, there were four reported hematomas in the closed-palm group which resulted in prolonged wound healing in each case, and in one case, full-thickness skin loss in the palm required subsequent skin grafting. Consideration must also be given to the possible influence of undetected hematoma and persistent edema in potentiating postoperative scar formation and thereby limiting ROM. The open-palm technique may, therefore, be most applicable for patients with extensive disease if leaving the palmar wound open would avoid wound closure under tension and ensure adequate blood supply to the wound margin. The open wound also prevents hematoma formation in the palm and immediately permits increased MP extension.

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Microvascular changes in Dupuytren's contracture

Previous studies of certain fibrotic lesions (hypertrophic scar, keloid, pseudotendon) have revealed pervasive microvascular occlusion. Lowered oxygen tension is considered to be a stimulus to excessive collagen production and, hence, the scar. Because its characteristics are similar to those of other lesions, Dupuytren's contracture appeared to be a good model in which to confirm the presence of occluded microvessels. Six cases were examined by light, electron, and polarizing microscopy. Most of the microvessels from the precontracture band area throughout the periphery of the body of the nodules were occluded by a bulging of the endothelial cells into the lumen. The microvessels were surrounded by extensive layers of basal laminae. The nodules were essentially avascular. The presence of another fibrotic lesion in which pervasive microvascular occlusion occurs is suggestive of an underlying biologic principle concerning the generation of all fibrotic lesions. (J HAND SURG 9A:58-62, 1984.)

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Dupuytren's contracture is a fibrotic disease of the palmodigital aponeurosis in man in which the highly oriented collagenous matrix enlarges to form nodules and laminated bands. The etiology of this affliction is unknown, although several theories have been suggested concerning its origin and numerous important observations made concerning its pathogene-