

## FREE GRAFT OF FASCIAL TUBE IN FLEXOR TENDON REPAIR IN THE DIGITAL SHEATH OF THE HAND

*An Attempt at a Composite Tissue Autograft*

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Various reconstructive methods have been reported for cicatricial tendon beds. Since 1970, when the flexor tendon gliding mechanism of the finger has been damaged in the area of "no man's land" and conditions are less than optimal for conventional tendon grafting, the authors have attempted to graft a fascial tube including tendon and paratenon of the palmaris longus. The technique is described and the results reported.

*Key words:* free graft; fascial tube; flexor tendon repair; no man's land; hand; composite tissue autograft

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The results of free tendon grafting for the division of flexor tendons in the so-called no man's land are not always satisfactory (Suzuki 1971). This is especially true when the preoperative condition of the fingers is poor due to extensive scarring from poor initial treatment. Many studies have reported preventing adhesion of the free tendon graft. The authors have tried to replace the defective skin with a pedicle skin graft and have also investigated the use of millipore membranes and silicon rods. The purpose of this paper is to report our clinical experience with the use of palmaris longus tendon wrapped with the adjacent fasciae (Boyes 1964, Suzuki 1973) in an attempt to provide a favorable tissue environment for the grafted tendon (Figure 1).

### METHOD

Incisions are made as shown in Figure 2. In order not to expose the palmaris longus tendon free in the air, fine nylon sutures are loosely placed at each side of the tendon as shown in Figure 3. Then the fascial tube of the necessary length is removed with the paratenon and the tendon, as shown in Figure 4.

In the recipient finger, the divided tendons and the damaged sheath are resected completely. If the digital sheath is intact, this sheath is preserved as much as possible. When the digital sheath is absent, the edge of the grafted fascia is sutured to the remnant of the digital sheath at both sides. The distal end of the tendon is sutured to the distal phalanx with a pull-out wire technique, and the proximal end is usually sutured to the profundus tendon with criss-cross wire sutures. When the retinacular ligament can be approximated, it is sutured with nylon and the skin is closed with interrupted sutures. After careful dressing, a plaster cast is applied with the wrist in moderate flexion and

the finger joints in slight flexion. After 4 weeks' immobilization, the cast is cut and all the sutures including the pull-out wire are removed, and active exercise is initiated.

**RESULTS**

Fifteen fingers in 14 patients have been treated with this method since 1970. Table 1 summarizes the data on the patients. Thirteen were male and only one was female. Their ages ranged from 17 to 39 years.

Seven fingers had had unsuccessful tendon surgery previously, and the others had extensive scars from poor initial treatments.

The results of the operation were assessed on the basis of bow-stringing, fingertip-to-palm distance and loss of extension as shown in Table 2. The results of 12 out of 15 fingers were unsatisfactory. Unfortunately, there was no definite proof that our attempted idea had anything to do with the tendon not adhering and not bow-stringing.

**DISCUSSION**

The purpose of our method were: 1. prevention of adhesion and 2. substitution of the pulley mechanism by suturing

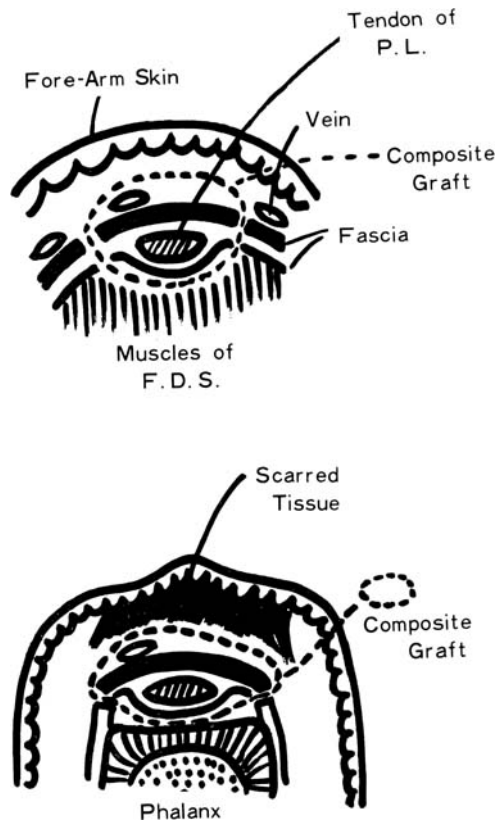


Figure 1. Transverse section of the forearm and the finger.



Figure 2. Skin incisions.

Table 1. Summary of 14 patients.

Patient	Sex	Age	Finger	Injured by	Preoperative grade				Time from injury to reconstruction
					Scar	Nerve	Joint	Multiple	
1. 05460 N.S.	M	19	R. Index	Machine	+	—	—	—	5 months
2. 05549 H.A.	M	22	R. Mid. & Ring	Machine	+	—	—	+	6 months
3. 10703 S.K.	M	25	L. Index	Glass	+	—	—	—	4 months
4. 12534 K.M.	M	28	L. Index	Chisel	+	—	—	—	4 months
5. 16652 K.I.	M	27	R. Ring	Glass	+	+	—	—	1 month
6. 16455 H.T.	M	23	L. Mid.	Glass	+	+	—	—	7 months
7. 20256 T.N.	M	20	L. Ring	Rotating saw	+	+	—	+	5 months
8. 26259 Y.O.	M	17	R. Mid.	Rotating saw	+	+	+	—	4 months
9. 30104 T.S.	M	38	R. Ring	Machine	+	—	—	—	1 month
10. 30884 H.H.	F	39	L. Index	Rotating saw	+	+	+	+	2 months
11. 32460 A.T.	M	25	R. Ring	Door	+	—	—	+	3 weeks
12. 33462 M.S.	M	30	R. Mid.	Knife	+	—	—	+	2 months
13. 33573 A.O.	M	33	L. Ring	Machine	+	+	—	—	4 months
14. 36307 M.N.	M	20	L. Index	Steel	+	+	—	—	2 months

Table 2. Results of follow-up (8 to 36 months, average 20 months).

Patient	Finger	Pulley defect in			Bow-string at		Distance of pulp from distal P.C.	Loss of extension (in degrees)
		Meta-carpal	P. phal.	M. phal.	M.P.J.	P.I.P.J.		
N.S.	R. Index	—	+	+	+	+	6.0 cm	39
H.A.	R. Mid. & Ring	—	+	—	+	—	2.9 cm	76
		—	+	+	+	—	3.2 cm	82
S.K.	L. Index	—	+	—	+	—	2.6 cm	44
K.M.	L. Index	+	—	—	—	+	2.0 cm	56
H.T.	L. Mid.	—	+	+	—	+	5.5 cm	75
T.N.	L. Ring	—	—	+	+	+	2.8 cm	32
Y.O.	R. Mid.	—	—	+	+	+	3.0 cm	30
T.S.	R. Ring	—	—	+	—	+	2.8 cm	44
H.H.	L. Index	+	—	—	—	—	5.6 cm	36
A.T.	R. Ring	—	—	—	—	—	4.5 cm	46
A.O.	L. Ring	—	—	+	—	+	1.9 cm	18

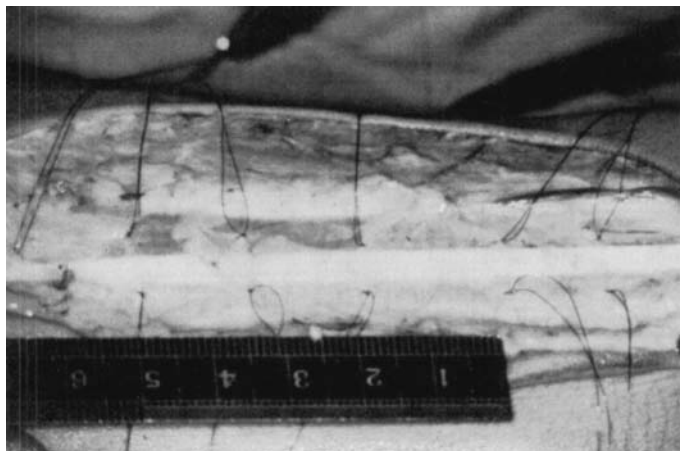


Figure 3. Sutured fasciae at each side of the palmaris longus tendon.

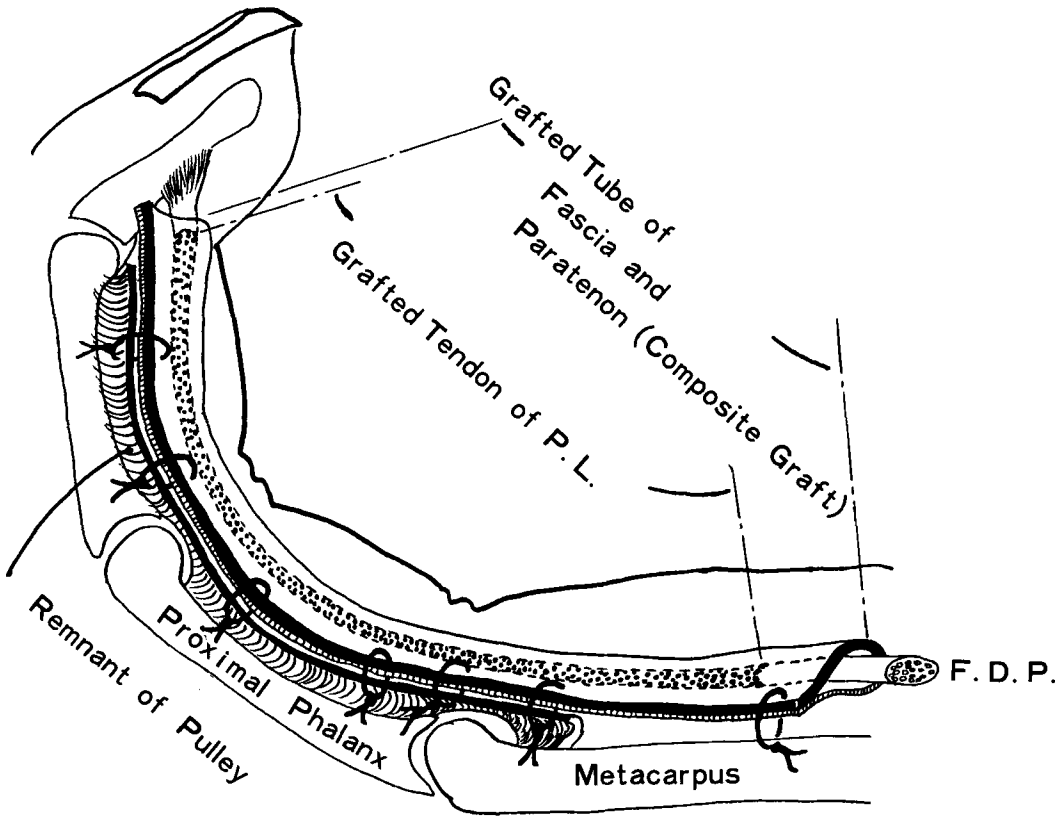


Figure 4. Grafted fascial tube.

the fascia to the base (Peacock 1960, Cameron et al. 1970). The postoperative results suggested that adhesion might have been prevented to some extent, but the presence of bow-stringing in the majority of the cases indicated that the

pulley mechanism had not been satisfactorily replaced by this technique. And, the authors must admit, this technique would have a limited value in cases in which the scarring is not so extensive as to require the use of a silicon rod (Grais-

Table 3. Recommended procedures.

Scar of the Soft Tissue Before Surgery	Pedicle Skin Graft	Recommended Procedure
Less	(-)	Usual Free Tendon Graft
Moderate	(+)	Composite Graft or Graft of Fascial Sheath
Severe	(+)	Silicon Rod

ford et al. 1969, Hunter et al. 1969, Hunter & Salisbury 1971), but not optimal enough to do a conventional free tendon grafting (Goldner & Coonrad 1969, Boyes & Stark 1971). With further improvement of the technique the authors hope that the results will be more favorable and that the pulley mechanism can be substantially preserved (Barton 1970) or otherwise reconstructed (Table 3).

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