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*J Hand Surg [Br]* 2000 25: 442

DOI: 10.1016/S0266-7681(00)80008-X

The online version of this article can be found at:

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# SEVERE DUPUYTREN'S CONTRACTURE OF THE PROXIMAL INTERPHALANGEAL JOINT: TREATMENT BY TWO-STAGE TECHNIQUE

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**Thirty-four patients with a Dupuytren's contracture in excess of 70° of the proximal interphalangeal (PIP) joint were treated by preliminary palmar fasciotomy, release of the accessory collateral ligaments and PIP joint distraction using the S-Quattro for 6 weeks. A formal fasciectomy with full thickness skin graft was then performed 2 weeks after removal of the fixator.**

**There was a mean residual flexion deformity of the PIP joint of 22° (mean correction of 67°) at an average follow-up of 30 months. There were no infections or amputations. We recommend this technique for the management of severe Dupuytren's contracture of the PIP joint.**

*Journal of Hand Surgery (British and European Volume, 2000) 25B: 5: 442-444*

One of the most difficult problems faced by hand surgeons is the management of severe Dupuytren's contracture affecting the proximal interphalangeal (PIP) joint. Primary excision may not result in good correction because of significant soft tissue contracture around the joint. Andrew (1991) carried out an anatomical study of seven amputated digits with severe Dupuytren's disease of the proximal interphalangeal (PIP) joint. He reported that five out of seven digits extended fully after release of accessory collateral ligaments and that the remaining two required additional release of the palmar plate.

Gradual distraction to stretch soft tissues is a recognized method of treatment for severe PIP joint contracture. (Beard and Trail, 1996; Hodgkinson, 1994). The S-Quattro (Osteotec Ltd, Christchurch, UK) is a simple device designed for the treatment of difficult phalangeal fractures. (Fahmy, 1990; Fahmy et al., 1998). This paper reports the use of S-Quattro in the treatment of severe PIP joint flexion contracture in Dupuytren's disease.

## MATERIALS AND METHODS

Patients with severe Dupuytren's contracture of the PIP joint (more than 70° flexion) were treated by two-stage correction between 1993 and 1998. Patients with recurrence of the disease and revisions were excluded. There were 28 males and six females and the little finger was affected in the majority (23). All operations were performed by the senior author (NRMF). The first stage was done under local anaesthesia and involved palmar fasciotomy, open release of the accessory collateral ligaments of the PIP joint, and if necessary, part of the collateral ligament. The procedure involves identifying the lateral bands through small incisions on either side of the PIP joint. These are incised in the line of the fibres and separated using skin hooks. The accessory collateral ligament, which extends between the collateral ligament and palmar plate, is then cut transversely and the S-Quattro fixator is applied in the distraction mode across the PIP joint.

Patients were then seen in the clinic on a weekly basis with lateral X-rays to assess the degree of correction. After 2 weeks, a second spring (Turbo) was applied to the S-Quattro fixator to achieve more distraction. Serial X-rays were then used to ensure that there was enough distraction of the PIP joint to prevent point loading of the articular cartilage during correction of the deformity. Distraction was continued for 4-6 weeks and the fixator was then removed. A flexion block splint was used to maintain the correction for a further 2 weeks during which time the soft tissues recovered and the pin tracks healed. Each finger was then left free of splints for 2 days prior to the second operation.

A standard fasciectomy of the finger and palm was then carried out under general anaesthesia. As a result of the period of distraction the tissues had stretched and had become soft, allowing easy dissection. Any defects in the skin which had developed as result of straightening the finger were covered with full thickness skin grafts taken from the front of the wrist, with primary closure of the donor site. A small drain was used routinely. Patients were given intensive physiotherapy and a splint for use at night for 6 months. Residual and recurrent deformity and the range of movements were recorded postoperatively and at 6-monthly intervals.

## RESULTS

The results are given in Table 1. The average pre-operative deformity was 89° (range, 70°-110°) at the PIP joint and 26° at MCP joint (range, 0°-90°). One patient (case 18) did not proceed to fasciectomy after the initial distraction due to social circumstances. Full correction of the PIP joint was obtained in 16 patients. Eleven patients had less than 20° of PIP flexion deformity, and six had between 21° and 60° immediately after excision. All patients had full correction of the MCP joint deformity. At final review (mean, 30 months; range, 6 to 58 months), no finger had a residual deformity of the MCP joint. Nine patients had full correction at the PIP joint and 13 patients had less than 20° of residual

Table 1—Results for individual patients

Case	Age	Sex	Finger	Pre-op. deformity		Deformity before stage 2 correction		Immediate postop.		6 months follow-up		Final follow-up		Range of movements of PIPJ	Duration of follow-up (months)	Degree of correction of PIPJ	
				MCP	PIP	MCP	PIP	MCP	PIP	MCP	PIP	MCP	PIP				
1	MC	75	F	Ring	90	90	45	45	0	0	0	0	0	0	0-90	60	90
2	SH	67	M	Ring	40	70	30	30	0	0	0	10	0	10	10-110	47	60
3	AH	47	M	Ring	40	90	30	20	0	10	0	35	0	40	40-110	30	50
4	GB	58	M	Little	50	95	30	75	0	30	0	20	0	20	20-95	36	75
5	GW	48	M	Little	0	90	0	45	0	30	0	90	0	90	90-95	37	0
6	DR	66	F	Little	45	70	10	40	0	20	0	40	0	60	60-100	31	10
7	DR	66	F	Ring	45	70	20	20	0	20	0	25	0	50	50-90	31	20
8	EE	53	M	Little	45	110	0	60	0	20	0	25	0	25	25-110	36	85
9	LW	66	M	Little	30	95	30	60	0	0	0	15	0	15	15-115	6	80
10	RS	69	M	Little	30	90	10	40	0	0	0	0	0	0	0-115	36	90
11	BW	77	F	Little	40	95	10	30	0	10	0	20	0	20	20-90	38	75
12	JH	73	M	Ring	40	90	0	75	0	40	0	60	0	80	80-100	38	10
13	GC	73	M	Little	70	95	25	50	0	0	0	10	0	10	10-30	26	85
14	EW	72	M	Little	0	80	0	30	0	0	0	0	0	10	10-100	45	70
15	MP	44	M	Little	20	100	0	45	0	10	0	10	0	10	10-110	51	90
16	GH	62	M	Little	0	110	0	45	0	0	0	30	0	35	35-110	58	75
17	RN	77	M	Little	30	95	0	45	0	0	0	0	0	0	0-115	38	95
18	DL	78	M	Little	0	80	0	45	No op.	No op.	No op.	No op.	0	45	45-100	6	35
19	MT	58	M	Little	40	70	0	40	0	0	0	10	0	15	15-110	23	55
20	RS	75	M	Ring	20	110	0	40	0	10	0	10	0	10	10-100	58	100
21	TR	64	M	Little	0	90	0	70	0	30	0	30	0	30	30-90	24	60
22	GY	70	M	Little	30	70	20	40	0	0	0	0	0	0	0-115	38	70
23	TK	69	M	Little	40	95	0	30	0	20	0	20	0	20	20-100	24	75
24	MN	65	M	Ring	20	90	0	20	0	0	0	0	0	0	0-110	21	90
25	FD	79	M	Little	0	100	0	30	0	15	0	20	0	20	20-90	40	80
26	EW	66	M	Ring	10	95	0	40	0	15	0	15	0	15	15-100	36	80
27	SA	74	F	Little	20	110	0	60	0	40	0	40	0	40	40-90	48	70
28	CV	80	M	Little	10	95	10	20	0	0	0	0	0	10	10-110	40	85
29	PL	59	M	Little	30	90	10	20	0	0	0	0	0	0	0-115	12	90
30	AC	63	M	Ring	10	110	0	70	0	40	0	40	0	50	50-70	14	60
31	KM	71	M	Little	20	70	0	20	0	0	0	0	0	0	0-115	9	70
32	MM	68	M	Ring	40	70	20	35	0	0	0	0	0	0	0-90	17	70
33	BH	77	M	Ring	0	90	0	50	0	20	0	30	0	30	30-100	20	60
34	DC	56	F	Little	20	70	0	20	0	0	0	0	0	0	0-115	7	70

deformity. Nine patients had a residual PIP joint contracture of between 21° and 60° and two of more than 60°. The average residual deformity of the PIP joint was 22° (range, 0°–90°). The average correction achieved at the PIP joint was 67° (range, 0°–100°).

Two patients had poor range of movement (cases 5 and 30). Case 5 did not attend physiotherapy and had a poor outcome. Case 30 had a poor result because of loosening of the fixator from a fall, which necessitated early removal. All except two patients could make a fist so that the fingertip touched the palm. There were no amputations.

## DISCUSSION

Severe finger contracture due to Dupuytren's disease is a difficult problem to treat. In some of the patients, the deformity is so great that the only option is an amputation.

The use of skeletal traction devices to stretch the diseased tissue is an accepted method of treatment in severely affected fingers (Beard and Trail, 1996;

Hodgkinson, 1994). Bailey et al. (1994) reported on the biochemical changes in the tissues during distraction, and found increased levels of degradative enzymes such as neutral metalloproteinases (collagenase and gelatinase) and the acidic cathepsins B and L. Both these groups of enzymes depolymerize collagen fibers causing a loss of tensile strength and its resorption. The increase in enzyme activity is thought to be stimulated by tension on the fibroblasts during the continuous stretching. Brandes et al. (1994) performed electron microscopy studies of Dupuytren's tissue after distraction and compared this tissue with standard Dupuytren's tissue from patients with the same clinical stage of the disease. They concluded that diseased tissue reacts to stretching by reorientation of all tissue components produced by myofibroblasts. Hodgkinson (1994) reported on the use of skeletal traction for the correction of the flexed PIP joint in Dupuytren's disease prior to surgery. He found that there was a pre-operative improvement of at least 45° in the flexion angle and that the subsequent surgery was facilitated so that amputation could be avoided.

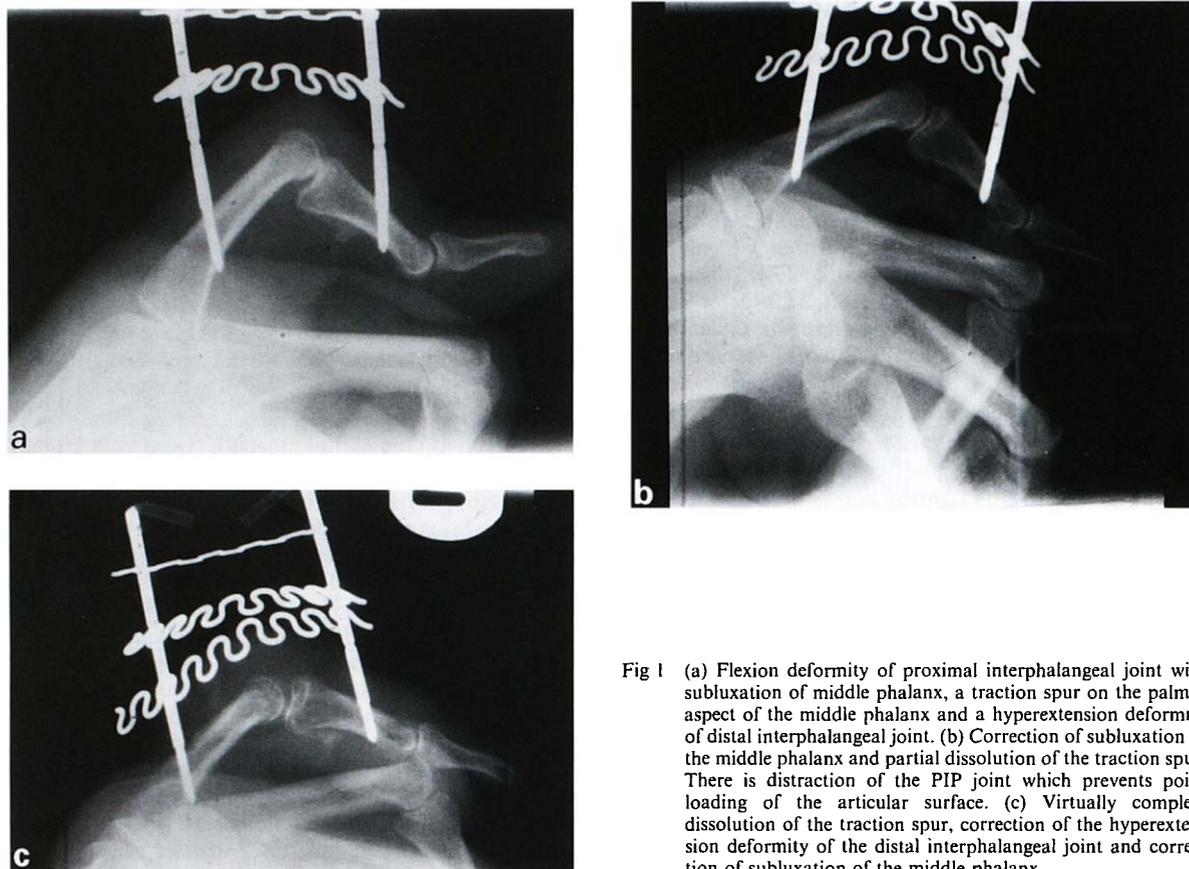


Fig 1 (a) Flexion deformity of proximal interphalangeal joint with subluxation of middle phalanx, a traction spur on the palmar aspect of the middle phalanx and a hyperextension deformity of distal interphalangeal joint. (b) Correction of subluxation of the middle phalanx and partial dissolution of the traction spur. There is distraction of the PIP joint which prevents point loading of the articular surface. (c) Virtually complete dissolution of the traction spur, correction of the hyperextension deformity of the distal interphalangeal joint and correction of subluxation of the middle phalanx.

The use of the S-Quattro has been reported by Beard and Trail (1996) who used it to apply postoperative traction when there was a residual flexion deformity of more than 40° after fasciectomy. They found that, even though this produced an initial improvement, there was a high rate of recurrence (55%). Other complications including infection, loosening, stiffness and amputation were also encountered. We believe that their unsatisfactory results might be because the S-Quattro applied tension on the surgical wound. Preoperative stretching with the S-Quattro results in a smaller tissue defect after fasciectomy, thus reducing the size of the skin graft required. The distraction of the PIP joint (Fig 1) prevents point loading of the articular cartilage, which may cause chondrolysis, finger stiffness and a poor outcome.

We conclude that two-stage correction using S-Quattro is a good method in the treatment of severe Dupuytren's contracture of PIP joint.

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Received: 2 December 1999

Accepted after revision 24 March 2000

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DOI: 10.1054/jhsb.2000.0412, available online at <http://www.idealibrary.com> on IDEAL®