

The Use of Splinting as a Non-Surgical Treatment for Dupuytren's Disease: a Pilot Study

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A preliminary study of six patients with Dupuytren's disease treated with external night splintage has demonstrated a reduction in digital contractures without loss of composite flexion. The greatest benefit was noted in patients with early, proliferative disease and was dependent on compliance with the splintage.

INTRODUCTION

Dupuytren's disease is a deforming, fibrotic condition affecting the palmar fascia. There is a broad spectrum of involvement from slight thickening of the palmar fascia to widespread disease associated with severe digital contractures. To date there is no proven non-surgical method of treatment.

It has been recommended that surgery is undertaken when the proximal interphalangeal (PIP) joint contracts to 30 degrees of flexion (McFarlane 1990). However, surgical practice varies with some suggesting that any PIP joint contracture warrants surgery. The aim of surgery is to correct joint contracture. However, Tonkin et al (1984) found 54 per cent recurrence in patients with limited fasciectomy.

Many non-surgical techniques have been investigated including physical therapy, therapeutic ultrasound, steroid injections, splinting and vitamin E supplementation, but most have not been proven to be clinically useful.

Although post-operative splinting is often used, with some studies (Rives et al 1992) finding it of benefit, we have been unable to find any studies in the English literature specifically relating to pre-operative splinting.

Studies of skeletal traction by Messina and Messina (1993) and by Hodgkinson (1994) with patients with severe Dupuytren's contractures concluded that it may be clinically useful as a pre-operative technique.

There are three main classifications of Dupuytren's disease. Luck (1959) identified three stages. The

proliferative stage is indicated by the appearance of solitary or multiple soft nodules in the palm and fingers. The involutonal stage is indicated by flexion contractures in the palm and fingers. In the residual stage, a cord is present with joint contractures and joint changes.

Iselin (1951) described five stages:

- Stage 0 Small nodules, hand function not affected
- Stage 1 Nodules and cords in the palm and early contracture of MCPJ
- Stage 2 MCPJ contracture up to 30° and early contracture of PIPJ
- Stage 3 Contracture of IPJs more than 30° each
- Stage 4 Extreme flexion contracture of the digits. Sensory and circulatory disturbance.

Chiu and McFarlane (1978) also described three stages of Dupuytren's disease. Stage 1 is defined as early disease, clinically characterised by nodules in the palmar fascia without joint contracture. Stage 2, named 'active' disease, presents nodular thickening of the palmar fascia with associated joint contracture. In stage 3, the 'advanced' disease, progressive joint contracture for more than three years is noted with diffuse fibrotic thickening of the palmar fascia.

All essentially describe an early or proliferative cellular phase followed by a maturation phase, which goes on to a relatively acellular fibrotic stage. There is anecdotal evidence that surgery during the early proliferative phase is accompa-

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nied by dense post-operative scarring which can be difficult to control and may lead to recurrent digital contracture.

This study aimed to investigate the possible role of static night splinting in the control of Dupuytren's disease. The purpose was to assess if static splinting could control the flexion deformity and if MCP and PIP joint extension could be increased.

The study was conducted with patients that would be defined by Luck (1959) as in the proliferative and involucional stages, by Iselin (1951) as stage 2 and 3, and by Chiu and McFarlane (1978) as stage 2.

PATIENTS AND METHODS

Six patients, one female, five male, were enrolled in the study, with one male patient having bilateral involvement. The mean age of the patients in the sample was 57 years, ranging from 43 to 80 years.

Informed consent for participation in the study was obtained. Measurements of the affected joints were taken using a finger goniometer with two degree graduation for accuracy and were obtained before commencing the splint regime and at intervals afterwards. One therapist took all the measurements. Thermoplastic palmar-based finger extension splints were constructed, with velcro fastenings. The patients were instructed to wear the splints during sleep at night. The splints were remoulded as improvements were made.

RESULTS

Table 1 shows the hand, finger and joint affected for each patient and measurements of extension deficit taken before the splint, at two months, at

four months and where possible, at 6 months and 24 months after. All patients maintained full composite finger flexion throughout the duration of the study.

Patients 1 and 2 had early stages of disease (Iselin stage 2). Patient 1 achieved correction of the contracture and maintained this. Patient 1 was 75 years old with diabetes and an atrial fibrillation controlled with digoxin and warfarin. Under these circumstances, surgery would have been difficult and the aim was to prevent further flexion. Patient 2 did not achieve an increase in extension but did not experience any deterioration.

Patient 3 had significant PIP joint contracture (Iselin stage 3). He had a remarkable improvement early on but defaulted on follow-up after four months. He is a known alcoholic and has two head injuries and associated epilepsy. It has not been possible to obtain follow-up measurements. Patient 4 had a good early response with some relapse at two years but maintains an overall improvement.

Patients 5 and 6 had aggressive disease (Iselin stage 3) with plantar involvement and positive family histories. Both showed initial improvement but discontinued the splint regime and subsequently showed a marked deterioration.

DISCUSSION

All patients maintained or improved their initial range of movement while following the night splinting regime. The splints were worn initially every night, but discussion with the two patients who were followed up at 24 months indicated that they were able to maintain finger extension by wearing the splint for only three or four nights a week. Patients with established disease and a

Table 1
Measurement in degrees of active MCP or PIP joint extension at pre-splintage, 2 months, 4 months, 6 months and 24 months

Patient	Hand affected	Joint and digit affected	Pre-splintage	2 months	4 months	6 months	24 months
1	right left	MCP 5 th MCP 5 th	12 2	0 0	0 0	Did not attend	0 0
2	right	MCP 3 rd	10	Did not attend	Did not attend	10	Lost to follow-up
3	right	PIP 5 th	86	70	25	Lost to follow-up	
4	right	MCP 3 rd	30	16	17	Did not attend	22
5	left	PIP 2 nd	27	27	23	40 discontinued splint	
6	right	PIP 5 th	30	20	22	40 discontinued splint	

strong diathesis showed some improvement with splintage, but significant deterioration when this was discontinued.

The number of patients is small but it is our impression that splintage is of greatest value during the early, proliferative phase of Dupuytren's disease, when complete correction of the contracture may be obtained. Splintage during the intermediate, maturation or involutonal phase may be useful in controlling further contracture.

The mechanism of action is not clear. It has been suggested that application of axial tension to Dupuytren's cords increases the activity of matrix metalloproteinases (Tarlton et al 1998) thereby altering the balance between collagen resorption and deposition.

CONCLUSIONS

Most people currently use splinting post-operatively to help maintain post-operative extension. However, this study indicates that there may be a role for static night splintage in the treatment of early stages of Dupuytren's disease. A larger study is required to verify the results.

Splinting may also be useful in the treatment of established disease and for patients unfit or unwilling to undergo surgery, and may prove

useful as a pre-operative "holding" measure for patients awaiting surgery.

REFERENCES

Chiu H F, McFarlane R M (1978) Pathogenesis of Dupuytren's contracture: A correlative clinical-pathological study. *The Journal of Hand Surgery* 3:1, 1-10

Hodgkinson PD (1994) The use of skeletal traction to correct the flexed PIP joint in Dupuytren's disease: a pilot study to assess the use of the pipster. *Journal of Hand Surgery* 19: 534-537

Iselin M, Dieckmann G (1951) Traitement de la maladie de Dupuytren par plastie en Z totale. *La Presse Medicale* 67:59, 1394-1395

Luck J V (1959) Dupuytren's contracture: a new concept of the pathogenesis correlated with surgical management. *The Journal of Bone and Joint Surgery* 4:41A, 635-664

Messina A, Messina J (1993) The continuous elongation treatment by the TEC device for severe Dupuytren's contracture of the fingers. *Plastic and Reconstructive Surgery* 92: 84-90

McFarlane RM, Botz JS (1990) The Results of Treatment. McFarlane RM, McGrouther DA, Flint MH (eds) *Dupuytren's Disease. Biology and Treatment. (The Hand and Upper Limb Series). Churchill Livingstone, Edinburgh. Vol. 5: pp295-310*

Rives K, Gelberman K, Smith B (1992) Severe contracture of the PIP joint in Dupuytren's disease: results of a prospective trial of operative correction and dynamic extension splinting. *Journal of Hand Surgery* 17A (6): 1153-1159

Tarlton JF, Meagher P, Brown RA, McGrouther DA, Bailey AJ, Afoke A (1998) Mechanical Stress in vitro induces increased expression of MMPs 2 and 9 in excised Dupuytren's disease tissue. *British Journal of Hand Surgery* 23 (3): 291-296

Tonkin MA, Burke FD, Varian JPW (1984) Dupuytren's Contracture: a comparative study of fasciectomy and dermofasciectomy in 100 patients. *Journal of Hand Surgery* 9B:156-162

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