

Simultaneous Regional Fasciectomy, Skin Grafting, and Distraction Arthrolysis of the Proximal Interphalangeal Joint for Dupuytren's Contracture of the Little Finger

Motohisa Kawakatsu, Susumu Saito*

*Department of Plastic and Reconstructive Surgery, Sumiya Orthopaedic Hospital, Wakayama,
Graduate School of Medicine, Kyoto University, Kyoto, Japan

We present a 58-year-old right-handed man, who consulted us with an 11-year history of Dupuytren's disease. To correct contracture of the little finger, we performed regional fasciectomy, skin grafting, and distraction arthrolysis of the proximal interphalangeal (PIP) joint using an external fixator. Preoperative or postoperative skeletal traction has been advocated to treat potential or residual stiffness of the PIP joint in Dupuytren's contracture, but its intraoperative use has not been reported before. Our method has the advantage of treating each problem caused by Dupuytren's disease. A good range of painless PIP joint motion is achieved by our intraoperative distraction technique without interfering with the skin graft and without reducing extensor tone, while the healing period is shortened by performing all procedures simultaneously.

Keywords: *Simultaneous, Regional fasciectomy, Distraction arthrolysis, External fixator, Dupuytren's contracture*

INTRODUCTION

It is very difficult to treat severe contracture of the proximal interphalangeal (PIP) joint of the little finger in Dupuytren's disease when the patient has a long duration of symptoms prior to surgery. This is because there is combined contracture of the skin and subcutaneous tissue including the diseased cords, as well as joint stiffness involving the checkrein ligament and collateral ligament, and lack of extensor tone. Here we report our method of treating Dupuytren's contracture of the little finger by performing simultaneous regional fasciectomy,

skin grafting, and distraction arthrolysis of the PIP joint using an external fixator.

CASE REPORT

A 58-year-old right-handed man consulted us with an 11-year history of Dupuytren's disease of the right ring finger and little finger. The active and passive range of motion was 44/44° (extension/flexion) at the distal interphalangeal (DIP) joint of the little finger, -60/96° at the PIP joint, and -84/88° at the metacarpophalangeal (MP) joint (Fig. 1).

Surgery was performed under general anesthesia. The surgical procedure involved making a zigzag incision, followed by fasciectomy of the lateral, central and spiral diseased cords, after which gentle passive manipulation of the PIP and MP joints was performed. Full extension of the MP joint was achieved after manipulation, but the PIP joint could not be fully extended and immediately

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Correspondence to: Motohisa Kawakatsu

Department of Plastic and Reconstructive Surgery, Sumiya Orthopaedic Hospital, 337, Yoshida, Wakayama-shi, Wakayama 632-8552, Japan

Tel: +81-73-433-1161, Fax: +81-73-432-6054

E-mail: kawakatsu@sumiya.or.jp

reverted to a flexed position. Therefore, we fixed the MP joint with a Kirschner wire. Instead of performing capsuloligamentous release and Kirschner wire fixation, we employed distraction arthrolysis with an external fixator (Keisei Medical Company, Tokyo, Japan) when the PIP joint was extended. Intraoperatively, the PIP joint was widened to approximately 1.5 mm by this method. We attempted primary wound closure, but a full-thickness skin graft was required to cover the soft tissue defect of the palm and proximal phalanx (Fig. 2). The skin graft

showed complete take, so the PIP joint was gradually widened for 5 days (at about 0.4 mm once a day) until a gap of 3.5 mm was attained from 2 weeks after the first elongation (Fig. 3). After maintaining this gap for 3 days, the fixator and all sutures were removed. From the next day, active and gentle passive exercises were begun, and a dynamic splint was attached to the PIP joint to prevent flexion contracture. The patient never complained of the PIP joint pain during postoperative rehabilitation. At 2 years after surgery, the active range of motion was 5/80°

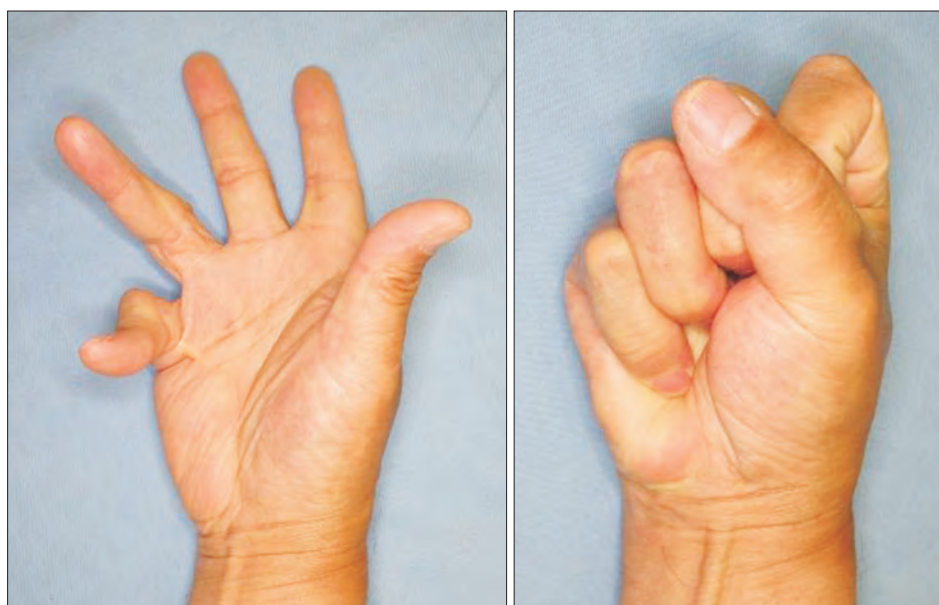


Fig. 1. Preoperative appearance.

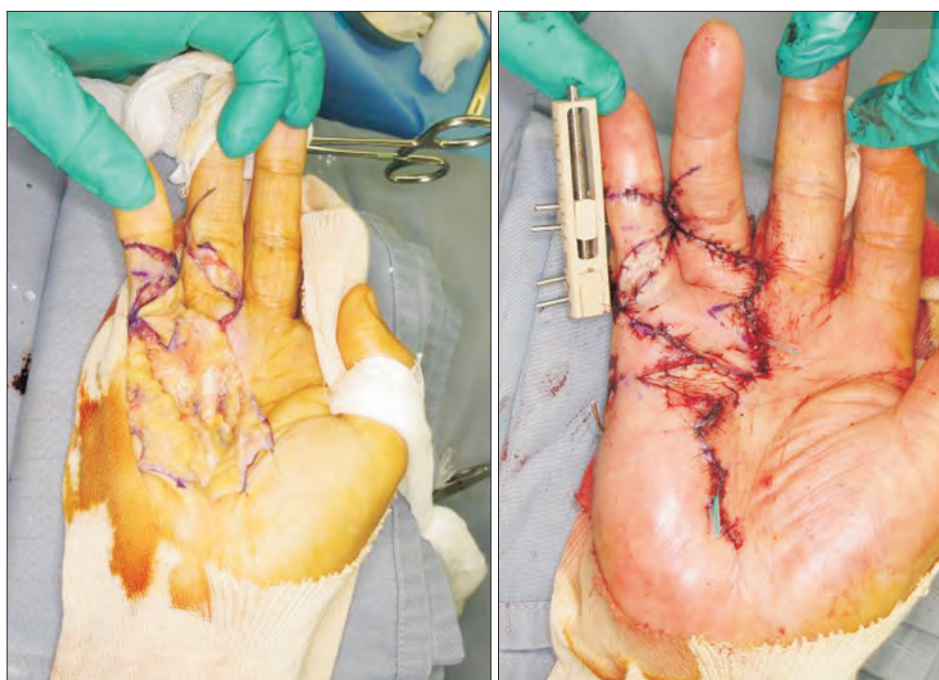


Fig. 2. Operative view.

(extension/flexion) for the DIP joint of the little finger, $-10/94^\circ$ for the PIP joint, and $0/94^\circ$ for the MP joint (Fig. 4). There were no complications and there has been no recurrence of contracture.

DISCUSSION

Various methods to overcome each problem caused by Dupuytren's disease have been reported and reviewed.^{1,2)} We have generally performed regional fasciectomy because needle fasciotomy alone is associated with a higher recurrence rate, together with primary wound closure (or skin grafting) because it causes less

soft tissue contracture, gentle passive manipulation of the PIP joint to avoid complications, and immobilization of the PIP joint with Kirschner wire to restore the extensor tone.¹⁻⁴⁾ Despite these measures, we do not always achieve satisfactory maximum active extension and painless postoperative PIP joint motion, especially when the little finger is severely affected.

Open capsuloligamentous release is useful for achieving further joint extension in patients with severe contracture of the PIP joint, but recurrence of contracture and the painful joint motion often occur due to postoperative fibrosis and/or adhesions. Associated complications, such as prolonged swelling, stiffness, or pain can be obstacles to postoperative rehabilitation.

Therefore, we previously reported⁵⁾ that distraction arthrolysis using an external fixator is a less invasive method that is effective for releasing joint stiffness and sustaining the extensor mechanism, achieving painless motion without arthritic change even in patients with severe trauma.

Preoperative or postoperative skeletal traction has been advocated to treat potential or residual PIP joint stiffness in patients with Dupuytren's contracture,⁶⁻⁸⁾ but the use of intraoperative traction has not been reported previously. Hodgkinson performed traction for 10 days to 4 weeks and fasciectomy was done a maximum of 10 days after the fixator was removed, with the result being that the average postoperative flexion deformity of the PIP joint of the little finger was 28.2° .⁶⁾ Rajesh et al. continued traction for 4-6 weeks. Then, the fixator was removed. After that, a flexion block splint was used to maintain the position for a further 2 weeks. Finally, fas-



Fig. 3. X-ray film obtained just before removal of the external fixator.

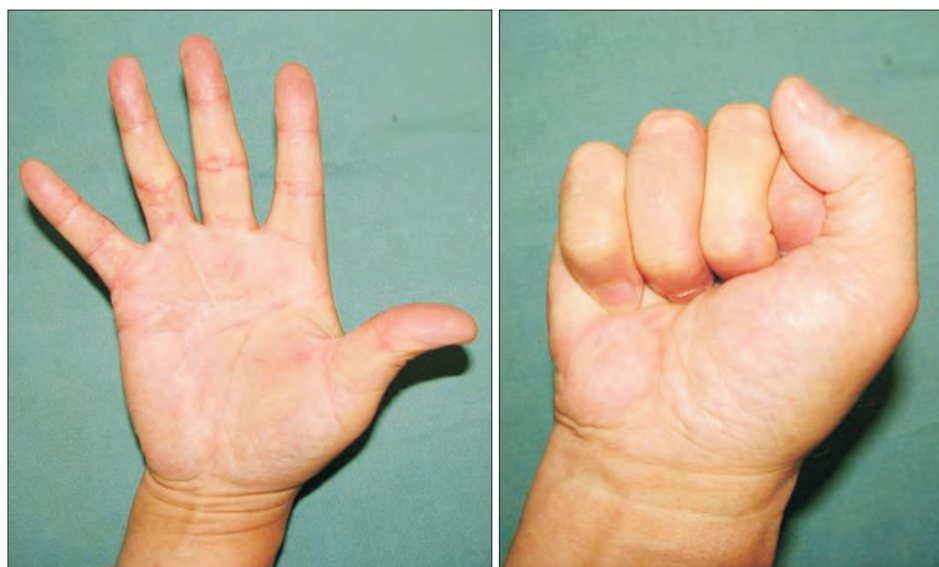


Fig. 4. Postoperative appearance.

ciectomy was done, after which the flexion block splint was removed and the finger was free for 2 days. As a result, the average postoperative flexion deformity of the PIP joint of the little finger was 20.6°. ⁷⁾ Beard and Trail continued traction for 2 weeks after performing Z-plasty or an open procedure rather than fasciectomy and the average postoperative flexion deformity of the PIP joint was 50.6° after the fixator was removed. ⁸⁾ Both Hodgkinson and Rajesh et al. stated that their patients wore an extension splint for 6 months, and they performed secondary fasciectomy to avoid reversion to a flexed position, while we carried out primary fasciectomy for the same purpose. ^{6,7)}

However, none of these authors described the distance and rate of elongation for distraction arthrolysis with an external fixator. ⁶⁻⁸⁾ The healing time of our patient was shorter and the outcome was acceptable compared with the results reported by these other authors.

The PIP joint may require preoperative distraction with a fixator to correct contracture due to the checkrein ligament or collateral ligament, and may also need distraction postoperatively to prevent recurrence of contracture and to obtain a good range of pain-free motion. Our method is characterized by performance of both preoperative and postoperative distraction. Since distraction of the joint also requires elongation of the extensor tendon, we gradually widened the PIP joint after maintaining the first elongated gap in extension for 2 weeks as reported by Rajesh et al. ⁸⁾ to allow recovery of extensor tone and healing of the operative wound.

We think that our distraction technique is indicated when contracture of the PIP joint is not completely corrected by continuous gentle manipulation or when vigorous manipulation would be required to achieve adequate extension and avoid open release. In our clinical experience, PIP joints affected by Dupuytren's disease show less fibrosis compared with joints after crush injury because a crushed joint is damaged more extensively and directly. The severity of contracture and the extensor tone depend on the disease duration and age of the patient in Dupuytren's disease. Therefore, we elongated the PIP joint by a shorter distance in the present case compared with our previously reported patients who had severe crush injury. ⁵⁾

Our method of managing the present case had the advantage of addressing each problem caused by Dupuytren's disease, while achieving a good range of pain-

free motion of the PIP joint postoperatively without interfering with the skin graft and without reduction of extensor tone at follow-up. Also, the healing time was kept as short as possible by performing some procedures simultaneously. However, further investigation is needed to determine the optimum distance, rate, and duration of elongation for distraction arthrolysis with an external fixator to alleviate contracture of the PIP joint of the little finger in patients with Dupuytren's disease.

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