

ORIGINAL ARTICLE

Clinical outcomes of primary skin closure with Y-V and Z-plasties for Dupuytren's contracture: Use of one-stage skin closure

TAKUYA UEMURA¹, KENICHI KAZUKI², TAKESHI EGI³, MASAHIRO YONEDA², KIYOHITO TAKAMATSU¹ & HIROAKI NAKAMURA¹

¹Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine, Osaka, ²Department of Orthopaedic Surgery, Osaka City General Hospital, Osaka, ³Department of Orthopaedic Surgery, Osaka Rosai Hospital, Sakai, Japan

Abstract

Y-V or Z-plasties are a useful one-stage technique for skin closure after aponeurotomy. However, we know no details about postoperative improvement, particularly at each joint. The purpose of this study was to evaluate the clinical outcomes of primary skin closure with Y-V and Z-plasties for Dupuytren's contracture. We retrospectively reviewed the postoperative results of 23 patients (25 hands, 29 fingers). The preoperative severity of the contracture evaluated by the Meyerding classification was grade I in 11 fingers, II in two fingers, and III in 16 fingers. In total, 26 metacarpophalangeal (MP) joints and 27 proximal interphalangeal (PIP) joints were treated. In each finger we assessed clinical outcomes according to the percentage improvement in extension and a modified version of Tubiana's classification. Primary wound closure was possible in all cases. The mean contracture values were improved from 46.5° preoperatively to 4.2° postoperatively for the MP joint and from 43.9° to 22.4° for the PIP joint. The mean percentage improvement in extension for the MP joint was 92% and for the PIP joint 56%. The rate for the PIP joint of the little finger was 40% and for the other fingers 78%. In total, 83% of the fingers had satisfactory results. For Dupuytren's contracture, primary skin closure with Y-V and Z-plasties gives satisfactory results, more so with involvement of the MP than the PIP joint and less so with involvement of the little finger.

Key Words: Dupuytren's contracture, Y-V plasty, Z plasty, local skin flap

Introduction

Dupuytren's contracture is caused by shortening and thickening of a pathological palmar aponeurosis that leads to progressive contracture of one or more fingers. Operation is recommended if the contracture is progressing and the function of the hand is impaired.

One of the problems with operating on a Dupuytren's contracture is how to close the skin of the fingers that have been stretched after resection of the aponeurosis. There are many methods of wound management, including skin grafting [1,2], the open palm technique [3–5], one-stage skin suturing with local skin flaps [6–8], and so on. The method of wound closure can, of course, influence the quality

of the scar and cause residual skin contracture. However, no consensus has yet been reached concerning the validity of these methods. King et al. reported a review of Dupuytren's operations with a zigzag incision and Y-V closure, stating that these incisions could permit radical fasciectomy, serious migration of the skin into the longitudinal axis, and minimal postoperative morbidity [7]. However, they provided no details about postoperative improvement at each joint.

We have used a one-stage wound closure using a local skin flap, and Y-V and Z-plasties, without skin grafting or the open palm technique, after partial fasciectomy. The purpose of this study was to report the short-term clinical outcomes of primary skin

Correspondence: Takuya Uemura, MD, Department of Orthopaedic Surgery, Osaka City University Graduate School of Medicine, 1-4-3, Asahi-machi, Abeno-ku, Osaka 545-8585, Japan. Tel: +81 6 6645 3851. Fax: +81 6 6646 6260. E-mail: t-uemura@med.osaka-cu.ac.jp

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closure with Y-V and Z-plasties for operations for Dupuytren's contracture.

Patients and methods

We retrospectively reviewed the postoperative results of 23 patients (25 hands and 29 fingers affected, in total) who had primary operations in our department between 2003 and 2007. There were 21 men and two women (14 affected right hands and 11 left hands). The mean age at operation was 69 (range 38–84 years) and none had been operated on before. The affected fingers were two middle fingers, 10 ring fingers, and 17 little fingers. The preoperative severity of the contracture, evaluated according to the Meyerding classification [9], was grade I in 11 fingers, grade II in two, and grade III in 16. There were no fingers rated as grades 0 or IV (Table I). In total, 26 metacarpophalangeal (MP) joints and 27 proximal interphalangeal (PIP) joints were treated.

Indications for operation were restriction of extension of 30° or more at either the MP or PIP joints, and functional disability in activities of daily living using the affected hand. For Dupuytren's contracture, partial fasciectomy, including the pathological palmar aponeurosis, was operated on under direct vision, the digital nerve being protected and separated. We did neither a capsulectomy or release of the volar plate. Subsequently, the wound was closed in one stage with local plasty flaps: Y-V and Z-plasties, by nylon sutures.

In principle, Y-V plasties had been used at each contracture joint. If the contracture of a joint was more than about 60° Z-plasties were used, combined with Y-V plasties (Figures 1, 2). Z-plasties were used on seven fingers of seven hands. Active range of movement exercises were begun about three days after the operation. When active mobilisation was begun, the static splinting in extension was used between periods of exercise and at night. The static splinting at night was continued for months. The passive range of movement exercises were added about two weeks after the operation.

Table I. Preoperative case numbers, assessed according to the Meyerding classification [9].

Finger	Meyerding classification (grade)					Total
	0	I	II	III	IV	
Middle	0	1	0	1	0	2
Ring	0	5	0	5	0	10
Little	0	5	2	10	0	17
Total	0	11	2	16	0	29

Clinical outcomes after the operation were evaluated in each finger, according to both the percentage improvement in extension at each joint and a modified version of Tubiana's classification [10]. The percentage improvement in extension was based on the postoperative rate of reduction of the contracture, calculated as the difference between the preoperative angle of restricted extension and postoperative angle of restricted extension. In short, the percentage improvement in extension (%) = [(preoperative angle of restricted extension – postoperative angle of restricted extension)/preoperative angle of restricted extension] × 100. We devised a version of Tubiana's classification modified for postoperative rating and applied it to each finger, mainly to the joint that was most affected preoperatively. The classification was composed of four categories: very good (normal external appearance and function, with the postoperative percentage improvement in extension 100%), good (pronounced improvement from the preoperative condition despite persistence of mild contracture, with the postoperative percentage improvement in extension over 50%), fair (improved slightly or unchanged from the preoperative condition, with the postoperative percentage improvement in extension less than 50%) and poor (no change in, or aggravation of, the preoperative condition). The postoperative follow-up period ranged from six to 32 months (mean 12).

Results

Primary wound closure was possible in all cases (Figure 1). There were no postoperative complications (including skin necrosis, wound dehiscence, haematoma, infection, or neurapraxia) except for one case of complex regional pain syndrome, in which symptoms were improved by steroids given orally, which finally resulted in a good outcome.

The mean preoperative contracture values were 46.5° for the MP joint and 43.9° for the PIP joint (Table II). Postoperatively, the mean contractures were improved to 4.2° for the MP joint and 22.4° for the PIP joint. With regard to the mean percentage improvement in extension for each joint, the rate for the MP joint was 92%. Conversely, the rate for the PIP joint was 56%, and less than that for the MP joint. Here, the percentage improvement in extension at the PIP joint was analysed in relation to the fingers affected. The rate for the PIP joint of the little finger was 40% and the rate for the PIP joint of the other fingers was 78%. The mean percentage improvement in extension at the PIP joint of the little finger was therefore less than for the other fingers.

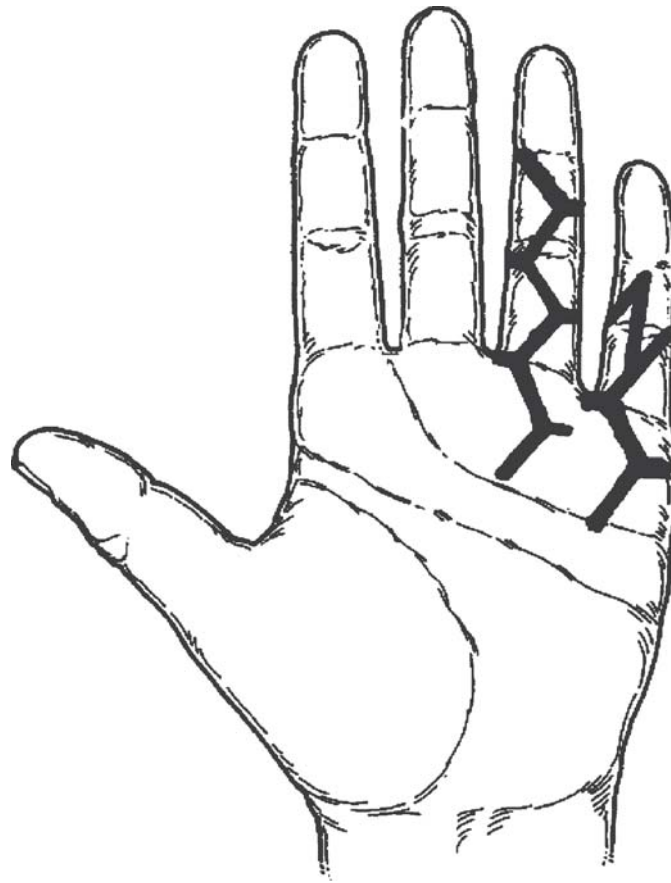


Figure 1. Diagram of the skin incision.

With regard to the modified version of Tubiana's classification for postoperative rating, 11 fingers (38%) were rated as very good, 13 fingers (45%) as good, four fingers (14%) as fair, and one finger (3%)

as poor (Table III): 83% had satisfactory results rated as very good or good. The cases rated as fair or poor included two fingers with a preoperative grade of I and three of grade III, and all such cases mainly had

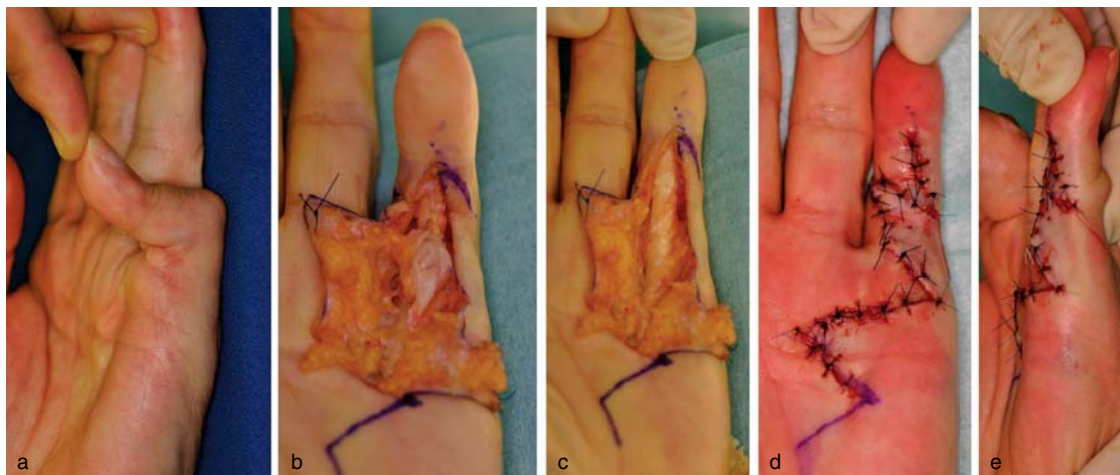


Figure 2. Representative cases with Y-V and Z-plasties. (a) The proximal interphalangeal joint of the little finger was flexed 90° and the metacarpophalangeal joint of the little finger was flexed 10°. (b) A Y-V plasty incision was made for the metacarpophalangeal joint contracture and a Z-plasty incision was made for the proximal interphalangeal joint contracture. (c) The palmar pathological aponeurosis was removed. (d) The wound was closed with Y-V and Z-plasties by nylon sutures. (e) Full extension of the little finger was finally gained.

Table II. Outcome of the operation.

	Metacarpophalangeal joint	Proximal interphalangeal joint
Preoperative contracture (°)	46.5	43.9
Postoperative contracture (°)	4.2	22.4
Postoperative percentage improvement in extension	92	56
Little finger	-	40
Other fingers		78

involvement of the PIP joint. These included a patient aged 84 years (the oldest of the patients studied).

Discussion

At present, various techniques are used to manage the wound after operations for Dupuytren's contracture, including skin grafting, the open palm technique, and primary closure. If skin grafting is used, the patient needs to keep the finger still until the graft has taken, and there is the problem of the morbidity of a second wound and the potential for failure of the graft [1,2]. The open palm technique involves the expense of prolonged healing time, frequent dressing changes, and a high risk of infection [3–5].

Conversely, primary skin closure with Y-V or Z-plasties [6–8] has the advantages of a short healing time and minimal participation by the patient in postoperative wound care, compared with skin grafting or the open palm technique. In a direct comparison of techniques, Gelberman et al. found that the healing time was 43% faster with primary closure compared with the open palm technique, but with strikingly higher morbidity [11].

King et al. reported a review of 170 consecutive operations for Dupuytren's contracture with a zigzag incision and Y-V closure, and stated that these incisions could permit radical fasciectomy, considerable migration of the skin into the longitudinal axis, and minimal postoperative morbidity [7]. However, they provided no details about postoperative improvement at each joint, such as the percentage improvement in extension. In the present study, we investigated that.

Table III. Postoperative case numbers according to the modified version of Tubiana's classification [10]. Data are number (%).

Very good	Good	Fair	Poor
11 (38)	13 (45)	4 (14)	1 (3)

A disadvantage of primary skin closure is that there is a higher rate of postoperative complications including failure of skin apposition, skin necrosis, and complex regional pain syndrome [8]. In the present study, however, we achieved primary skin closure in all cases with no morbidity related to the suturing of the wound, wound dehiscence, or skin necrosis.

Citron and Hearnden reported that the partial fasciectomy closed with Z-plasties had a lower rate of recurrence than those closed with a simple transverse incision, because the skin tension of the Z-plasties was lower [12]. Citron and Nunez subsequently reported that comparison of the outcomes of Y-V plasties and Z-plasties showed no significant difference in terms of recurrence of contracture, the incidence of postoperative complications, and the outcome of the operation [13]. Similarly, the present study showed that primary skin closure with Y-V and Z-plasties had satisfactory outcomes.

In the present study the percentage improvement in extension at the MP joint was high, while the percentage improvement in extension at the PIP joint was lower, particularly for the little finger. As a general tendency Hunter et al. reported that the rate of reduction of contractures was high at the MP joint but lower at the PIP joint [14]. Additionally, Adam and Loynes reported that outcomes became less successful in cases of little finger contracture involving the PIP joint [15]. Our data of primary skin closure were similar to theirs.

This study has limitations and several weaknesses that include the small number of cases (only primary ones), it was a retrospective study, and had a short follow-up period. It is desirable to study the subject further, perhaps in a randomised controlled trial with long follow-up period.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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