

Review Article

Review of Partial Fasciectomy for Dupuytren's Contracture in Southern Chinese Patients

探討局部筋膜切除術在治療患有掌肌膜攣縮症(迪皮特朗攣縮症) 的南中國病人之成果

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ABSTRACT

Dupuytren's contracture is a fibroproliferative disease of the palmar fascia producing fascial fibrosis in nodular or cord form, and results in flexion contracture of the involved fingers. In contrast to Western populations, Dupuytren's contracture, especially the severe form of the disease, is not common in Southern Chinese patients: there have been only scant reports from the Southern Chinese region. In addition, the natural history and surgical outcome may be different from those of Western patients. The purpose of our study was to evaluate the clinical outcomes of Southern Chinese patients with Dupuytren's contracture treated with partial fasciectomy through a Bruner's incision. Twenty-nine Chinese patients (45 fingers) with Dupuytren's contracture were reviewed retrospectively from 1999 to 2008. All patients underwent partial fasciectomy performed under general anaesthesia. The ranges of movement of the metacarpophalangeal (MCPJ) and proximal interphalangeal (PIPJ) joints were measured preoperatively and during follow-up to assess the degree of correction after surgery. A total of 34 out of 45 fingers (75.6%) and 30 out of 45 fingers (66.7%) had regained a full range of movement of the MCPJs and PIPJs, respectively. In addition, 26 out of 29 patients (89.6%) had an improvement in extension of their MCPJs, and 20 out of 29 patients (68.9%) showed a gain in extension of their PIPJs. One in 29 patients (3.4%) developed a wound infection and needed further surgery for debridement. One patient had recurrent PIPJ contracture after partial fasciectomy (3.4%). None of our patients had a neurovascular injury or wound healing problem. We conclude that partial fasciectomy with a Bruner's incision yields satisfactory results in Southern Chinese patients that are comparable to results from Western studies.

中文摘要

迪皮特朗攣縮症 (Dupuytren's Contracture) 是由手掌筋膜纖維增生化病變形成。它造成結節狀或條索狀纖維增生，並引致有關之手指攣縮。對比起西方國家，迪皮特朗攣縮症 (特別是嚴重的類型) 在中國南方并不常見。過往有少數研究指出南中國迪皮特朗攣縮症病人的自然史和手術結果可能不同於西方的病人。我們研究的目的是為了評估南中國迪皮特朗攣縮症患者以布魯納切口進行局部間膜切除術的臨床結果。

在1999年至2008年間，我們回顧分析了29個中國病人患有迪皮特朗攣縮症的個案(共45隻受影響的手指)，所有患者均在全身麻醉下進行局部筋膜切除術。

我們量度了術前及術後掌指關節 (MCPJ) 及近端指間關節 (PIPJ) 的活動幅度然後作出比較來評估手術後的改善幅度。其中34隻受影響的手指 (75.6%) 於手術後得到MCPJ 活動幅度的完全恢復，而30隻受影響的手指 (66.7%) 於手術後得到PIPJ 活動幅度的完全恢復。其中26個病人 (89.6%) 的MCPJ 的伸展能力於術後得到改善，而20個病人 (68.9%) 的PIPJ的伸展能力於術後得到改善。

在29個病人當中，其中一人 (3.4%) 出現傷口發炎的併發症而需要進行清創手術，另一人 (3.4%) 的指節攣縮症狀在術後復發。在我們的病人當中，沒有發生其他併發症，如神經線或血管受損或傷口無法愈合等。

我們推斷利用布魯納切口進行局部筋膜切除術來治療南中國病人患有迪皮特朗攣縮症，是可得到滿意的治療效果，而結果是相當於西方的研究。

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Introduction

Dupuytren's contracture is a flexion contracture of the hand named after Baron Guillaume Dupuytren, the surgeon who described an operation to correct this flexion contracture.

It is a fibroproliferative disease of the palmar fascia that produces fascial fibrosis in nodular or cord form and results in contracture of the involved fingers. The ring finger and little finger are those most commonly affected. The middle finger may be affected in advanced cases, but the index finger and the thumb are nearly always spared. Males are more commonly affected than females (M:F ratio 4:1–10:1), and the incidence in women increases with age.

Diabetes mellitus is a risk factor for Dupuytren's disease, especially in patients requiring antidiabetic medication rather than those whose diabetes is controlled by diet alone. In patients with a family history of Dupuytren's disease, a history of alcoholism or an early age of onset of the disease, the lesion is likely to progress more rapidly than usual.^{1,2} Some authors have suggested that it might be caused by oxygen free radicals that stimulate the proliferation of myofibroblasts and cause an increase in type III collagen and platelet-derived growth factor B.^{1,2}

Surgical management consists of open or percutaneous fasciotomy, partial fasciectomy, regional fasciectomy or radical fasciectomy. Different types of skin incision can be used for exposure in Dupuytren's contracture, for example longitudinal or transverse incisions, Bruner's incision and multiple small curved incisions.

Dupuytren's contracture is an uncommon disease entity among the Southern Chinese population, with few reports in the English-language literature. The clinical features and surgical outcome may be different from those of the Western patients. The purpose of our study was to evaluate the clinical features and outcomes of Southern Chinese patients with Dupuytren's contracture treated with partial fasciectomy through a Bruner's incision.

Method

Twenty-nine Southern Chinese patients (45 fingers) with Dupuytren's contracture treated with partial fasciectomy under general anaesthesia were reviewed retrospectively from 1999 to 2008 in our hospital. A Bruner's zigzag incision was used in 43 operations and zigzag-plasty in the other two cases because of



Figure 2. Excise the pathological cord.

severe skin contracture. Only the pathological cord was excised (Figures 1 and 2). Primary closure could be achieved in all patients, and none required skin grafting (Figure 3).

During the postoperative period, a boxing glove was given to all patients in the first 1–2 days. The dressing was changed to a thin, non-adhesive dressing in the first week. Active and passive mobilization exercise was started in the early postoperative period. In some patients (6 out of 29), night splinting was applied to achieve maximum extension. These patients had more than one finger involved.

The average length of follow-up was 32 months (range 10–60 months). Clinical outcomes were evaluated, including recurrence of cord formation, postoperative metacarpophalangeal joint (MCPJ) or proximal interphalangeal joint (PIPJ) contracture and other complications.

Results

The patients' demographic data are shown in Table 1. Of the 29 patients, 20 were male and 9 were female. Forty-five fingers were involved in these 29 patients. The average age was 68 years old (range 44–94 years). The ring finger was the most common digit



Figure 1. Identify the pathological cord.



Figure 3. After closing the skin wound.

Table 1
Patients' demographic data

Total number of patients	29
Male:female ratio	20:9
Age (years)	68 (range 44–94)
Total number of involved fingers	45
Thumb	1
Index finger	1
Middle finger	12
Ring finger	18
Little finger	13

affected ($n = 18$), followed by the little finger ($n = 13$) and middle finger ($n = 12$). The thumb ($n = 1$) and index finger ($n = 1$) were least commonly involved. Three out of the 29 patients (10.3%) had bilateral involvement. All of them had the operations performed at two occasions for the two hands.

Associated conditions

Ten of the 29 patients (34%) had diabetes mellitus, and five patients were chronic alcoholics (18%). One patient had fibromatosis of the plantar fascia of both soles and was diagnosed as having Ledderhose's disease. None of our patients had a family history of Dupuytren's contracture.

MCPJ and PIPJ contracture

The degree of MCPJ and PIPJ contracture with maximal passive extension was measured in degrees preoperatively and upon follow-up 26 weeks after the operation.

The average preoperative MCPJ contracture was 35.62 degrees (range 10–90 degrees), and this decreased to 3.23 degrees (range 0–20 degrees) after surgery (paired t test, $p < 0.05$) (Figure 4). The average preoperative PIPJ contracture was 31 degrees (range 10–80 degrees) and decreased to 8.6 degrees (range 0–20 degrees) (paired t test, $p < 0.05$) (Figure 5).

Average grip strength

The grip strengths of the operated hand and the uninvolved hand were measured after partial fasciectomy. The average grip

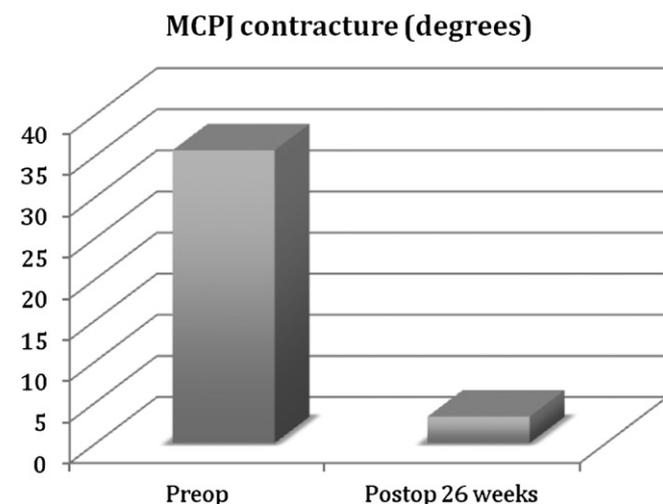


Figure 4. Degree of metacarpophalangeal joint (MCPJ) correction after surgery ($p < 0.05$).

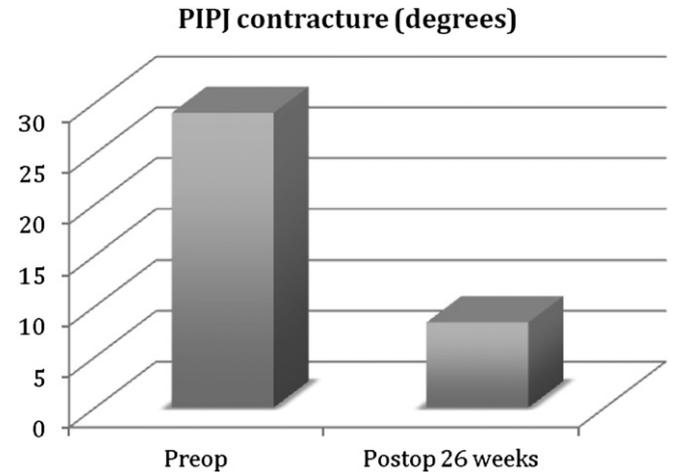


Figure 5. Degrees of proximal interphalangeal joint (PIPJ) correction after surgery ($p < 0.05$).

strength was 25.3 kg (range 16–35 kg) on the operated side and 27.6 kg (range 17–38 kg) on the opposite side (Student t test, $p = 0.11$).

Complications

One of the 29 patients (3.4%) developed a wound infection and needed further surgery for debridement. A further patient (3.4%; 2 out of 45 fingers, 4.4%) had recurrent PIPJ contracture due to recurrence of the cord. This occurred in the involved ring finger and little finger 2 years after the primary operation. This patient had Ledderhose disease.

None of our patients, including the patient with a wound infection, had neurovascular injury or wound healing problems requiring skin graft.

Discussion

Diabetes mellitus and alcoholism are associated with Dupuytren's contracture both in Western populations and also in Southern Chinese patients. In our study, 34% of patients with Dupuytren's contracture had diabetes, and 18% were chronic alcoholics. Smoking and excessive alcohol intake are independent risk factors for the development of this disease. The relation of the two factors is also dose-dependent (odds ratio 1.5–2 for smoking and 1.35–4.2 for alcohol).³ The condition is more prevalent among individuals with diabetes, especially those dependent on insulin.^{1,2}

Partial fasciectomy is one of the standard treatments for Dupuytren's contracture. However, the rate of complications is high, reported as about 17% overall.⁴ The complications include damage to the surrounding structures (e.g. digital vessels and nerves) at the time of surgery due to the change in the neurovascular bundle position in patients with Dupuytren's contracture and because of wound healing problems. The formation of the spiral cord causes PIPJ contracture and displaces the neurovascular bundle in three directions: (1) towards the midline, (2) proximally, and (3) superficially. As a result, the digital nerves become positioned close to the pathological cord and to the skin incision that makes them vulnerable to damage at operation.^{2,5} By being aware of this pathoanatomy, one can decrease the chances of neurovascular injury.

Care should be taken to preserve the vascular supply to the skin, avoiding undermining of the skin and overtensioning it during

Table 2
Reported recurrence rate by various authors

First author	Year	Cases	Follow-up (months)	Recurrence rate (%)
Hueston ¹¹	1963	96	24	12.5
McFarlane ⁷	1966	100	12	2
Honner ¹²	1971	108	48	19
Tonkin ¹³	1984	100	38	46.5
Norotte ¹⁴	1988	58	120	71
Makela ¹⁵	1991	160	38	27
Leclercq ¹⁶	2000	50	120	66
DeMaglio ¹⁷	1996	124	33	24.1
Hall ¹⁸	1997	67	48	8
Armstrong ¹⁹	2000	103	70	11.6
Current study	2008	29	32	3.4

wound closure. As skin contracture occurred in some patients with Dupuytren's contracture, direct closure of the wound after partial fasciectomy may be problematic. Z-plasties, which enable lengthening of the contracted palmar skin, can be performed. If there is inadequate skin coverage despite the local lengthening procedure, we can leave the wound partially opened or perform skin grafting.⁶

In this study, 34 out of 45 fingers (75.6%) and 30 out of 45 fingers (66.7%), respectively, had regained a full range of movement of the MCPJ and PIPJ after surgery. A total of 26 out of 29 patients (89.6%) and 20 out of 29 patients (68.9%) showed an improvement in extension of their MCPJs and PIPJs, respectively. McFarlane and Jamieson reported that 84% of their 1150 cases had a full range of MCPJ movement after partial fasciectomy, as did 18% for PIPJ movement.⁷ Cheng et al. reported that the mean gain in extension was 76% (79% for the MCPJs and 65% for the PIPJs) after percutaneous fasciectomy.⁸

Dias and Braybrooke reported that 826 of the 1177 patients (70%) had a full or almost full correction of deformity after partial fasciectomy or dermatofasciectomy with skin grafting.⁹ However, these authors also suggested that the degree of correction depended on the initial degree of deformity. The rate of good correction decreased to 160 of 264 (61%) in patients who had severe contractures of both the MCPJ and the PIPJ.

Draviaraj and Chakrabarti suggested that an improvement in hand function could be achieved after decreasing the finger contracture in Dupuytren's disease.¹⁰ Moreover, an improvement in PIPJ contracture showed a greater correlation with hand function than did a decrease in MCPJ contracture. In their study of 30 patients with Dupuytren's contracture treated with either percutaneous fasciotomy or limited fasciectomy, there was a statistically significant correlation between Sollerman hand function score and PIPJ correction at 6 months ($p = 0.031$) and at 12 months ($p = 0.017$) after surgery. However, this did not apply to MCPJ correction at 6 months or 12 months ($p = 0.340$ and 0.560 , respectively).

In the present study, the degrees of both MCPJ and PIPJ contracture were significantly decreased when compared with the degree of flexion contracture before surgery ($p < 0.05$). The grip strength of the operated hand was not significantly lower than that of the opposite hand ($p = 0.11$). It is suggested that the grip strength of the operated hand is comparable to that of the opposite side after operation.

The rates of recurrence have been reported to be 2–71% (Table 2) by different authors. One (3.4%) of the 29 patients in our study developed recurrent MCPJ and PIPJ contracture. Norotte et al.

suggested that age less than 50 years, advanced stage of contracture at presentation, relapsed disease, ectopic presentation such as Ledderhose disease and a positive family history of Dupuytren's contracture were worse prognostic factors.¹⁰ These patients were prone to develop recurrent disease even after good surgical correction.

Dias and Braybrooke also suggested that recurrent disease was more likely to be seen in patients with a greater initial deformity. The recurrence rate was 0.8% in patients with mild MCPJ contracture but 14% in those with severe initial MCPJ and PIPJ contracture. They also suggested that incomplete correction was another risk factor for recurrent contracture. Their reported recurrence rate was 14% (10 of 73) after full surgical correction and 100% (14 of 14) after a poor surgical correction.⁹

Conclusion

In Southern Chinese patients, Dupuytren's contracture is a condition with a male predominance that is associated with diabetes mellitus and alcoholism. The ring finger is the most commonly affected digit, followed by the little finger. Partial fasciectomy with a Bruner's incision yields satisfactory results in Southern Chinese patients with Dupuytren's contracture that are comparable to results from Western studies.

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