Abductor Digiti Minimi Involvement in Dupuytren’s Contracture of the Small Finger

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**Purpose:** Dupuytren’s contracture (DC) is a common, benign, progressive condition. Patterns of involvement of the ulnar side of the hand, specifically the involvement of the abductor digiti minimi (ADM), have received limited attention; therefore, the purpose of this study was to determine the prevalence, patterns of involvement, and surgical outcomes in DC of the small finger.

**Methods:** A retrospective review was performed on the hands of all patients who had surgery for DC between January 1998 and March 2002 to determine the incidence of ADM involvement.

**Results:** A total of 149 patients had 195 surgeries on 261 digits during this period. Forty-seven percent of cases involved the small finger and 27% of those involved the ADM. Those cases involving the ADM had statistically significantly greater mean preoperative proximal interphalan-geal joint (PIP) contracture (53°) as well as postoperative PIPJ contracture (34°) when compared with those without ADM involvement of the small finger (31° preoperative PIPJ contracture and 15° postoperative PIPJ contracture, respectively). The most common origin pattern of the ADM involvement was found to arise from both the ADM tendon and overlying fascia (77%). The most common insertion pattern was found to be over the middle phalanx (50%).

**Conclusions:** We conclude that ADM is involved in DC of the small finger in one quarter of cases. Failure to recognize and resect the diseased cord arising from it and its overlying fascia at the time of surgery may account for the poor outcomes seen in DC of the small finger. (J Hand Surg 2004; 29A:510–513. Copyright © 2004 by the American Society for Surgery of the Hand.)

**Key words:** Abductor digiti minimi, Dupuytren’s contracture, small finger flexion contracture, Dupuytren’s patterns.

Dupuytren’s contracture (DC) is a benign fibromatosis of the hand. The development of nodules and cords in the palm leads to progressive digital contracture and functional disability. The patterns of diseased fascia were described initially by McFarlane in 1974 in what generally is considered a seminal publication, whereas Tubiana et al focused on the disease patterns on the radial side of the hand. The first detailed descriptions of the importance of the abductor digiti minimi (ADM) in the patterns of DC on the ulnar side of the hand were by White and Barton. These articles describe the nondiseased anatomy of ADM and the origin and insertion patterns of diseased ADM; however, neither looked at the impact of disease patterns on joint contractures or...
surgical outcomes. A complete description of the demographics of ADM involvement has not been presented.

The objectives of this study were: (1) to determine the prevalence of ADM involvement in DC of the small finger, (2) to describe the patterns of involvement of ADM, and (3) to describe the outcomes associated with ADM involvement, specifically residual postoperative joint contractures.

Materials and Methods

All patients who had palmar fasciectomy for DC between January 1998 and March 2002 by the 6 plastic surgeons (who performed hand surgery) at St. Joseph’s HealthCare in Hamilton, Ontario, Canada, were included in a retrospective case review. A search of the St. Joseph’s Health Care Medical Records stored in the Canadian Institute of Health Information database was completed by using the terms palmar fasciectomy, Dupuytren’s contracture, and Dupuytren’s disease. Data were collected on patient demographics, past medical history, affected digit, preoperative joint contractures, elements of diseased fascia involvement, origin and insertion of the ADM (if involved), and postoperative joint contractures.

Statistical Analysis

Statistical significance (p < .05) of pre- and postoperative joint contractures was determined by using 2-tailed Student t tests. Demographics were analyzed by chi square analysis.

Results

Demographics

From this search there were 149 patients identified who had 195 surgeries on 261 digits. Occurrence by digit was as follows: index, 3 of 261; middle, 32 of 261; ring, 107 of 261; and small, 119 of 261. A DC cord involving the ADM was identified in 32 of 119 of cases in the small finger.

Table 1 compares the patient demographics, occupation, and past medical history of the overall group with those patients having ADM involvement. The only statistically significant difference between the groups was the increased occurrence of trauma to the affected hand in the past medical history of those patients having ADM involvement (p < .025).

Joint Contractures

A significant difference was determined between the mean preoperative metacarpophalangeal joint contractures without ADM involvement (34°) and those with ADM involvement (17°) (p < .05).

Statistically significant differences were determined between the mean preoperative proximal interphalangeal joint (PIPJ) contractures without ADM involvement (31°) and with ADM involvement (53°) (p < .05). The difference in the mean postoperative...
PIPJ contracture without ADM involvement (15°) and with ADM involvement (34°) was also statistically significant. The average postoperative PIP joint contracture of all small finger cases is 24.5°. Pre- and postoperative joint contractures are summarized in Table 2.

### Origin and Insertion of Abductor Digiti Minimi Involvement

The origin of the ADM cord was described in the surgical records of 22 of the 32 patients. Four of the 22 patients (18%) were described as having an origin arising solely from the ADM tendon (Fig. 1). Seventeen of 22 patients were described as having an origin with contributions from both the tendon and the overlying fascia, and 1 of 22 had contributions arising from the tendon and directly from the base of the proximal phalanx itself.

Insertions patterns were as follows: 13 of 26 into the middle phalanx flexor sheath, 5 of 26 into the distal phalanx, 4 of 26 into a central cord, 2 of 26 into a pretendinous cord, 1 of 26 into a lateral cord, and 1 of 26 into the proximal phalanx.

### Cord Contributions to the Abductor Digiti Minimi

The 4 most common patterns of cord contributions in those fingers having ADM involvement were as follows: 16 of 32 (50%) had contributions from the ADM and a pretendinous cord, 6 of 32 (19%) had contributions from the ADM, a pretendinous cord, and a central cord, 3 of 32 (9%) had the ADM cord alone, 3 of 32 (9%) had the ADM cord, a pretendinous cord, and a radial spiral cord, the remaining 4 of 32 (13%) had other combinations of cord contributions.

### Discussion

In McFarlane’s article on the patterns of disease in DC he describes a severe contracture at the PIPJ of the small finger related to a spiral band attached proximally to the ADM. In 1982 McFarlane subsequently described 4 patterns of DC involving the small finger: (1) contracture of the metacarpophalangeal joint caused by a pretendinous cord, (2) contracture of the PIPJ with no connection between this tissue and the disease in the palm, (3) contracture of the distal interphalangeal joint associated with PIPJ contracture, and (4) hyperextension at the distal interphalangeal joint usually secondary to a flexion contracture at the PIPJ.

ADM involvement is not included in this description; however, in the same article mention is made that “on ulnar side it is common for the diseased fascia to originate in the tendon of the ADM.” In reviewing photographs of patients with DC from our files we confirmed McFarlane’s observation of the variability of the disease in the small finger.

Our data showed that nearly one third of all cases of DC of the small finger had ADM involvement, highlighting the importance of understanding the implications of its involvement.

Based on our review we believe there may be an underestimate of the true occurrence of ADM involvement. Given the variability and the quality of reporting in the details of the surgical reports there may have been additional cases of ADM involve-
ment that were not described in the reports. We suggest that a prospective study is necessary to find the true occurrence of ADM involvement in DC.

White\textsuperscript{3} dissected 20 cadaveric hands to establish the normal anatomy of the ADM and its overlying fascia. He described normal insertion onto the superficial transverse ligament, digital band, Grayson’s ligament, and the extensor expansion. Barton\textsuperscript{4} described the intraoperative disease patterns of 20 patients with ADM involvement. The most common origin described was that arising solely from the ADM tendon (60%). In contrast, we found that the most common origin was from both the tendon and the overlying fascia (77%). This pattern is not described in Barton’s\textsuperscript{4} article; the discrepancy may be owing to the retrospective nature of our study relying on the descriptions contained in the surgical reports from several surgeons. Since this study was completed we paid particular attention to these patterns in recently treated patients and found that the most common origin was broadly based from the fascia overlying the muscle belly of the ADM with distal contribution from the ADM tendon itself. Barton\textsuperscript{4} found that although the insertion patterns were highly variable, in 80% the insertion of the ADM involvement was over the middle phalanx flexor sheath. This is consistent with the results of our study.

Legge and McFarlane\textsuperscript{6} in 1980 showed that the postoperative outcome of the PIPJ was more variable than that of the metacarpophalangeal joint and varied between digits. The average residual contracture at the PIPJ in the index, middle, and ring fingers were 2°, 11°, and 13°, respectively, compared with 25° in the small finger. They also showed by using multiple logistic regression that the outcome of the small finger PIPJ depended on the state of the metacarpophalangeal joint. The presence or absence of ADM involvement was not considered.

In our study we have shown that those individuals with ADM involvement have both a more significant preoperative PIPJ contracture (53°) and postoperative PIPJ contracture (34°) when compared with those individuals without ADM involvement (all other patterns of involvement) (31° before surgery and 15° after surgery). When considering only those patients without ADM involvement, the joint contractures seen resemble more closely those of the other digits.

We would suggest then that the poor postoperative outcomes commonly encountered in DC of the small finger as described by Legge and McFarlane\textsuperscript{6} are a result of the involvement of the ADM. As well, the significant preoperative PIPJ contracture seen in patients with ADM involvement is likely owing to the common insertion pattern over the middle phalanx flexor sheath. The significant postoperative PIPJ contracture seen in these patients may be owing to failure to adequately recognize and release the involved ADM.

Considering the potential for injury to the ulnar digital nerve during surgery we attempted to explore the incidence of ulnar digital nerve complications in this series with ADM involvement. Unfortunately this information was recorded in only 7 of the 32 charts reviewed. Only one chart specifically mentioned that the ulnar digital nerve was found transected and was repaired at another surgery. Five cases mentioned that the ADM cord was found to be pushing the neurovascular bundle radially, and in one case it was mentioned that the neurovascular bundle was embedded within the ADM cord. There was insufficient information to make an accurate statement on the rate of injury to the ulnar digital nerve.

We recommend that in the preoperative assessment of patients with DC of the small finger, particular attention be paid to the degree of contracture of the PIPJ. Consideration should be made to the involvement of the ADM if notable PIP joint contracture is seen. We recommend that careful intraoperative exploration of the involved ADM including all its origin and insertion patterns is undertaken in these patients.

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References