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Case-controlled Study

Residual deformity versus recurrence following Dupuytren's palmar fasciectomy-a long term follow-up of 142 cases

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ABSTRACT

Introduction: and background: Surgical options for Dupuytren's disease (DD) are multiple, and Dupuytren's palmar fasciectomy (PF) is a common surgical procedure performed for contractures that cause functional and cosmetic disability. The recurrence rate for PF has been reported to be very variable, ranging from 12 to 73%, according to various studies. One of the reasons for the varied range is the inconsistency in the method followed to define recurrence. Subsequently, a consensus-based definition was formulated in 2016, and we analysed the outcome in our series of patients treated with PF based on this standard definition. We also analysed the residual deformity associated in these cases.

Method: ology: Our study is a retrospective analysis of 142 consecutive cases of primary Dupuytren's palmar fasciectomy by a single surgeon in three different centres. We followed the international consensus definition for analysing recurrence in these cases, and we also analysed residual cases as a separate entity.

Results: The mean age of the cases was 67.13 years and the mean follow-up period was 3.95 years. Alcoholism, smoking, diabetes and hypercholesterolemia were the commonest associated risk factors. The commonest affected finger and the finger with the maximum deformity were the little finger. The overall rate of recurrence of deformity was 3.5% and the rate of residual deformity was 30.3%. The overall complication rate was 11.9%.

Conclusion: Recurrence and residual deformity can be considered as separate entities. The term 'residual deformity' can be used to denote patients with persisting deformity or those who incur deformity within one year of the primary surgery.

1. Introduction

Dupuytren's disease (DD) is caused by pathologic palmar fascia that contracts and pulls the fingers towards the palm [1,2]. Different surgical options are available for DD depending on the circumstances of the patient, and ranges from minimally invasive techniques like percutaneous needle aponeurotomy to dermofasciectomy which uses skin grafting [3–6]. For severe primary cases of DD, the palmar fasciectomy (PF) is the preferred procedure with good success rates and has been widely performed [7].

Regardless of the surgical procedure carried out, DD is notorious for its recurrence, and according to various reports, the recurrence rate ranges from 12 to 73% [6]. A reason for the wide range of recurrence values in literature is the lack of clear definitions about this conditioning initially [8]. According to the 2016 consensus, recurrence in Dupuytren's disease has been defined as "more than 20 degrees of contracture recurrence in any treated joint at one year post-treatment compared to six weeks post-treatment" [9]. Moreover, persistent or residual deformity including those that appear within the first year following fasciectomy has not been discussed as a separate entity in any of the previous studies as per our knowledge and this has not been compared with that of recurrence according to the consensus definition.

With this background, we aimed at analysing the recurrence following Dupuytren's palmar fasciectomy (PF) done by a single surgeon in three different centres over a six year period based on the consensus definition [9]. We also analysed the incidence of residual deformity (RD)

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in our series, and the contribution by various predisposing factors and patient demographic factors.

2. Materials and methods

After obtaining institutional review board approval (IRB- CA2262), all consecutive patients operated with palmar fasciectomy (PF) for primary Dupuytren's disease from January 2014 to December 2020 under the supervision of a single surgeon (supervising author) were analysed retrospectively. Data was gathered from the hospital electronic records, and the work has been reported in line with the STROCSS criteria [10]. A positive Hueston's tabletop test [11] with a deformity significantly affecting the daily activities of the patient was the surgical indication. Clinical findings noted included the number of fingers involved and the preoperative deformity in the involved joints that had been recorded using a goniometer. The extent of deformity was recorded as the extension deficit in degrees (°). Demographic data including age, gender, comorbidities like diabetes and other chronic diseases and extra palmar manifestations (Dupuytren's diathesis) were noted. The predisposing factors of DD like family predisposition, presence of ectopic foci, other hand surgeries, smoking, alcoholism, diabetes, epilepsy and anti-epileptic drugs, arthritis, liver failure, renal diseases, hypercholesterolemia and thyroid dysfunction were also noted [7]. Patients with recurrent disease and those operated under other consultants were excluded.

All the cases were performed under a tourniquet control, and an operating loupe was used to enable better visualisation of the operative field. Brunner's type zigzag incisions were used [12]. First, the skin was meticulously stripped off the tissue underneath. In case of pretendinous cords, they were identified proximally and then dissected through distally, taking care to separate the neurovascular structures. Dissection was carried out three dimensionally by including the intermetacarpal septa whenever pathological involvement was present. The dissected Dupuytren's tissue was removed en-masse and any remaining discrete foci were also removed. After clearance of the pathogenic tissue, any lack of full extension due to residual arthrogenic contracture were noted.

The volar capsule or volar plate was released to attain maximum correction in case of contractures of the MCP or PIP joints. During closure of the wound, the corners of the incisions were transversely extended for relieving tension while suturing. Skin closure was done by 3–0 interrupted nylon sutures. After application of bandage and volar finger extension slab, the tourniquet was released.

Postoperatively, the patients were seen by an occupational hand therapist in a week's time. Full-time splinting of the hand was used for the first six weeks and a nighttime splinting was used for another six weeks. Meanwhile, the patients were reviewed in the clinic periodically for monitoring the residual deformity, wound healing, occurrence of complications and to assess the correction in deformity and range of movements achieved. Sutures were removed in 2 weeks. During the clinic visits, they were monitored for the occurrence of residual deformity, complications and return of hand function. The cases were discharged from the clinic at six weeks to three months depending on the clinical situation but were brought back to the clinic in case of any concerns like recurrence or long-term complications.

3. Results

A total of 142 operations on 130 different patients were performed which included 96 men and 34 women. The distribution of cases according to age is shown in Table 1. The age of the patients ranged from 23 to 88 years (mean age of 67.13 years). The mean age at operation was 66.8 years for men and 68.2 years for women. There were 68 left hands and 74 right hands involved. The mean follow-up period was 3.95 years, with 63 cases with a follow-up period more than 3 years and 79 cases with a follow-up period less than 3 years. The association of predisposing factors in these cases were analysed and represented in Table 2. Of note, the major associated disease factors in our cohort were alcoholism (42.3%), smoking (25.4%), diabetes (23.2%) and hypercholesterolemia (20.4%).

Table 1
Number of patients, male/female (M/F) ratio and left/right (L/R) ratio.

Age group (years)	21–30	31–40	41–50	51–60	61–70	71–80	81–90
No. of patients (142)	1	1	6	25	50	50	9
M/F ratio (105:37)	1:0	1:0	6:0	17:8	36:14	37:13	7:2
L/R ratio (68:74)	0:1	0:1	2:4	12:13	24:26	27:23	3:6

Regarding the severity of deformity, the frequency of involvement of DD with respect to the finger affected is shown in Table 3, with the maximum involvement of little finger, at 67.6% of the cases and ring finger, at 40.1% of the cases. The maximum pre-operative deformity was seen in the little finger (64.08% of the cases) and ring finger (23.94% of the cases).

The average maximum preoperative deformity in any particular joint was 70.6° which ranged from a lowest deformity of 20° and a highest deformity of 110°. The cases with a maximum deformity more than 60° was further analysed and found that 73.33% of cases (44 cases out of 60) were without any predisposing factors while 69.51% of cases (57 cases out of 82) had at least one of the predisposing factors. On comparing these two groups, no significant differences in their proportions were found on performing a 2-proportions test (P value of 0.617). Moreover, the joints with the maximum deformity in the preoperative group were the proximal interphalangeal (PIP) and the metacarpophalangeal (MP) joints affecting 52.1% and 45.8% of the cases respectively.

On analysing the correction of deformity obtained in degrees, all the cases obtained a significant correction post surgically with respect to the preoperative deformity on performing a paired *t*-test (*P*-value 0.000). The 95% confidence interval (CI) for the mean difference between the preoperative and the postoperative deformities was between 57.9° and 66.2°. For the PIP joint, the 95% CI for mean difference between the preoperative and postoperative deformities was between 61.2° and 72.9°, and for the MP joint, this range was between 49.6° and 61.1°.

Regarding recurrence and residual deformity, the rate of recurrence was found to be 3.5% (5 out of 142 cases), and that of residual deformity was 30.3% (43 out of 142 cases). It was found that the occurrence of residual deformity was significantly higher than that of recurrence, with a P value of 0.000 on performing a 2-proportions test. In the subset with residual deformity, 34 cases (79.1%) had a deformity less than or equal to 30°, showing a significant improvement in their deformity postoperatively, with a P value 0.000 on performing a 2-proportions test. On the other hand, only 9 cases (20.9%) had a deformity more than 30° in

Table 2
Showing associated predisposing factors of Dupuytren's disease in our cohort.

Disease (%)	No. Patients	
	Male	Female
Family predisposition (6.3)	7	2
Ectopic foci (3.5)	4	1
other hand surgeries (1.4)	2	0
Smoking (25.4)	25	11
Alcohol (42.3)	45	15
Diabetes (23.2)	24	9
liver failure (1.4)	2	0
renal disease (4.2)	5	1
Hypercholesterol (20.4)	23	6
Thyroid (2.1)	3	0
epilepsy/antiepileptics (1.4)	2	0

Table 3
Frequency of preoperative deformity with respect to the finger affected.

Finger involved	No of cases (percentage)
Little finger	96 (67.6%)
Ring finger	57 (40.1%)
Middle finger	22 (15.5%)
Index finger	9 (6.3%)
Thumb	3 (2.1%)

this subset.

Regarding complications, the overall complication rate was 11.9% (17 cases out of 142). These included complex regional pain syndrome (CRPS) (3 cases), nerve lesions (9 cases), wound complications including infection, gaping and seroma formation (13 cases). None of the cases involved arterial injury or the need for amputation.

4. Discussion

The current study is an analysis of 142 primary Dupuytren's palmar fasciectomy (PF) with a mean follow-up period of 3.95 years, representing the English population. The highest incidence of surgery was seen in men and women between 50 and 80 years. Family predisposition was found in only 6.3% of the patients in our series compared with 12.5%7–26% in the literature [13,14]. Alcohol, smoking, diabetes and hypercholesterolemia were the commonest associated conditions with DD; however, these associations were found mainly in males, as shown in Table 2. The importance of this could not be validated statistically as the number of women in each group were low (n </ = 16). The ratio between men and women with respect to associated conditions was found to be similar to that of the study by Coert et al. [7]. In addition, cases with a maximum preoperative deformity more than 60° did not have any statistical difference between those with and without any of the predisposing factors.

Regarding the involvement of particular fingers in the series, the most common deformity seen in the preoperative group was in the little finger (67.6%), followed by ring (40.1%) and middle finger (15.5%), with even fewer cases involving index finger and thumb. Correspondingly, it was seen that the maximum preoperative deformity was confined to the little finger in 64.08% cases and ring finger in 23.94% cases. This finding is comparable to the study by Dais et al., who followed up 63 patients after PF for a period of 5 years. He found that the little finger was involved the most, amounting to 52 out of 63 cases followed by the ring finger (19 cases) [15]. Regarding the deformity at specific joints in our study, the PIP joint was the site of maximum deformity in 52.1% cases followed by the MP joint in 45.8% cases.

Regarding recurrence of deformity, universally, there was a clear lack of agreement about what constitutes recurrence and therefore it was nearly impossible to compare various alternative treatment options [6,9,16,17]. In order to address this, a consensus was made in 2016 which involved the participation of 21 experts from 10 countries. They used the Delphi method, which is based on questionnaire-based surveys to arrive on a consensus [18]. According to the consensus, recurrence has been defined as more than 20 degrees of contracture recurrence in any treated joint at one year post-treatment compared to six weeks post-treatment. Based on this definition, we performed our analysis. We found that the rate of recurrence was found to be 3.5% (5 out of 142 cases). This is well below the recurrence rates of other reported studies, and their rates varied vastly, ranging from 12 to 73% [6]. Clearly, there would have been inconsistencies in the definition and method used to quantify deformity and recurrence which would have led to the vast range of recurrence in reports. A few studies defined recurrence [19–21], whereas others did not mention any definition to define recurrence in their studies [22,23]. Out of the five cases with recurrent deformity, four of the cases underwent revision surgery whereas one patient did not opt for another surgery.

The occurrence of residual deformity in our series was 30.3%. Among these 43 cases, nearly 80% of the cases had only a mild form of residual deformity accounting to </ = 30°. Since these cases had a residual deformity that was noticed intraoperative or in the immediate postoperative period, these were considered as the consequence of the primary disease rather than a recurrence. Moreover, these cases do not satisfy the consensus-based definition criteria which we used to define recurrence in our series. To our knowledge, none of the previous studies analysed residual deformity as a separate entity. Therefore, we suggest, the residual deformity seen immediately after the surgery or even within the first year of the PF should be considered under the category 'residual' rather than 'recurrence'.

The complication rate in our study was 11.9% which falls withing the previously published complication rates in PF which ranged from 4% to 29% [24,25]. The incidence of nerve lesions in our study was 6.33% which is comparable to that of the study by Coert et al., whose study showed nerve lesions in 5% of the primary surgeries and 12% of the surgeries for recurrent cases [7]. The lowest percentage of nerve lesions were reported by Robins et al. [26], at 0% and Makela et al. [27], at 1% respectively. The occurrence of CRPS in our study was 2.1% which is well below the value reported by Gonzalez and Watson et al., who noted 10% incidence in their study including 30 patients.

To conclude, our study showcases a large series of primary Dupuytren's fasciectomy which was evaluated in terms of recurrence using the consensus definition of recurrence. We suggest that the category 'residual deformity' can be used to denote patients with persisting deformity or those who incur deformity within one year of the primary surgery. The results of the study can help surgeons to treat and advise patients undergoing Dupuytren's palmar fasciectomy.

Ethical approval

Yes. IRB- CA2262.

Consent

Yes, patient consent was obtained.

Registration of research studies

1. Name of the registry: www.researchregistry.com.
2. Unique Identifying number or registration ID: researchregistry7399.
3. Hyperlink to your specific registration: https://www.researchregistry.com/browse-the-registry#home/

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Credit statement

Niranj Ganeshan Radhamony: Conceptualization, Methodology, Writing- Original draft preparation.

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Sachith Sreenivasan: Conceptualization, Methodology, Writing-Original draft preparation.

Sriganesh Walkay: Conceptualization, Methodology, Validation, Writing- Reviewing and Editing.

Aditya Soni: Conceptualization, Methodology, Validation, Writing-Reviewing and Editing.

Rahul Kakkar: Conceptualization, Methodology, Validation, Writing- Reviewing and Editing, Supervision, Project Administration.

Location of the study

The study included data gathered from three hospitals in the UK.
Centre 1- Furness General Hospital, Barrow in Furness, UK.
Centre 2- Westmoreland General Hospital, Kendal, UK.
Centre 3- Royal Lancaster Infirmary, Lancaster, UK.

Declaration of competing interest

The authors do not have any conflicts of interest to disclose.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2021.103224.

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