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Dupuytren's Disease : a Predominant Reason for Elective Finger Amputation in Adults

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31 amputations, 12 (39%) for Dupuytren: more common than next two dx combined (vascular, late effect of trauma)

Avg 60 years old at amp, half were 55 or younger

Average 2.6 Dupuytren procedures before amputation

Key words. Hand surgery ; Dupuytrens's disease ; finger amputation.

Abstract. Dupuytren's disease (DD) can lead to severe disabling finger contractures resistant to surgical treatment. In some cases, finger or ray amputation is considered, due to a severe functional deficit or vascular injury. To evaluate the weight of amputation surgery in DD, a retrospective study was conducted over a 5-year time interval, outlining all indications for elective finger amputation and its prevalence in the total of surgical interventions for DD. The outcome in DD was compared to post-traumatic amputations. Out of 31 elective finger and ray amputations, 12 (39%) were indicated for DD, all in the 4th or 5th ray, of which 92% were in recurrent disease. In the 646 surgical procedures for DD in the matching time interval, we conclude that almost 2% were elective amputations. The outcome of amputation in DD was similar to post-traumatic amputations. Based on these data, we feel that patients should be informed that sometimes, surgical treatment for Dupuytren's disease can lead to an eventual decision to amputate.

Introduction

Dupuytren's disease (DD) can cause severe disabling finger contractures that are resistant to surgical treatment. Recurrence or extension of the disease is frequent, varying from 2 to 76% (1). Surgical complications in the treatment of DD are not uncommon. In recurrent DD, surgical risks are higher and outcome is less predictable. In some cases, salvage procedures, such as finger or ray amputations, are considered in severe functional deficit or neurovascular injury with numbness or cold intolerance (2).

In general, finger amputation is performed in acute hand injury with impossible or failed replantation (3-5). Somewhat less common are finger or ray amputations in an elective setting (6). Here also, indications are often post-traumatic with painful functional disability due to cold intolerance, neurinoma and infections (7). Next to these indications, there is a wide range of non-traumatic reasons for amputation, ranging from neoplasm to Dupuytren's disease (8).

To evaluate the weight of Dupuytren's disease in elective finger amputation and the incidence of amputation in the treatment of DD, a retrospective study was conducted.

Material and methods

All adult patients registered in our secondary referral hand centre, treated with finger or ray amputation between 2002 and 2007, were reviewed and their medical files were studied. The indication for the amputation, gender, age at time of surgery and type of surgery were noted. The data were compared with the total number of Dupuytren's surgical interventions in the same time interval.

To evaluate and compare elective amputation outcome in DD and post-traumatic disorders, the specific surgical indications in this subset of patients were reviewed. This group of patients was invited to fill in visual analogue scores for pain (ranging from 0 for no pain, to 10 for maximal pain) and satisfaction (ranging from 0 for not satisfied at all, to 10 for maximal satisfaction) and a Quick DASH score (ranging from 0 for no disability, to 100 for compete disability). A two-sample student t-test was used to compare the outcome data. The patients were asked if the amputation improved their pre-operative status and whether or not they regretted having the amputation.

Results

We found 31 finger and ray amputations. The demographic results are illustrated in table I. There were 25 male and six female patients with a mean age of 52 years (range 21 y-83 y). The indications for the amputations were Dupuytren's disease in 12 (39%), post-traumatic pain or functional disability in 10 (32%), congenital abnormalities in 3 (10%), Buerger's disease in 3 (10%), infection in 3 (7%) and a tumour in 1 (2%) (Fig. 1). In DD, 3 out of 12 (25%) were female patients. In total, there were 17 left and 14 right hands involved. The levels of amputation were the distal phalanx in 3, the proximal interphalangeal joint in 1, the metacarpophalangeal joint in 5 and a ray amputation in 22 of the

Table I

Illustrative table with the data of the 31 adult patients with elective finger amputation. (DD = Dupuytren's disease, M = male, F = female, PIP = proximal interphalangeal joint, MCP = metacarpophalangeal joint, R = right, L = left, DD surgery = in case of DD surgery, number of surgical interventions in the amputated ray)

No.	Gender	Age	Indication	Ray	Level	Side	DD surgery
1	M	45	Buerger	4	Ray	R	
2	M	67	DD	5	PIP	R	3
3	M	69	DD	4	Ray	L	3
4	M	53	Tumor	3	MCP	L	
5	F	73	Buerger	3	MCP	L	
6	M	21	Post-trauma	3	P3	L	
7	F	45	DD	4	Ray	L	4
8	M	24	Post-trauma	5	MCP	R	
9	M	23	Ollier	4	Ray	R	
10	M	51	DD	5	Ray	R	2
11	M	43	DD	4	Ray	R	3
12	M	40	Infection	2	P3	L	
13	M	60	CP	1	Ray	L	
14	M	48	Infection	3	MCP	R	
15	M	45	Post-trauma	3	Ray	R	
16	F	60	Buerger	5	P3	R	
17	F	55	DD	5	MCP	L	3
18	M	46	Post-trauma	2	Ray	L	
19	M	58	DD	5	Ray	L	3
20	M	68	Post-trauma	2	Ray	L	
21	M	45	DD	5	Ray	R	2
22	M	28	Post-trauma	2	Ray	R	
23	M	52	Post-trauma	5	Ray	L	
24	M	36	Post-trauma	2	Ray	L	
25	M	70	Post-trauma	2	Ray	L	
26	M	55	Infection	5	Ray	R	
27	M	80	DD	5	Ray	R	2
28	M	83	DD	5	Ray	L	1
29	M	49	DD	5	Ray	L	2
30	F	40	Mafucci	2	Ray	L	
31	F	76	DD	5	Ray	R	3

patients (Fig. 2). In the Dupuytren's surgery, 10 out of 12 were ray amputations (83%). All amputations in DD were in the 4th or 5th ray, in contrast to the other indications for amputations, which are spread over all rays (Fig. 3). Only 1 patient had a primary amputation at his own request, due to advanced age and a functionally disturbing 'en crochet' fifth finger deformation : all the others were DD recurrence (92%) with unsatisfying result after revision surgery due to pain, ischaemia and hooked finger deformity. In recurrent surgery, amputation was the 2nd, 3rd or 4th operation in the same ray with a mean of 2.5 interventions. In the same time interval of 5 years, we performed 646 surgical interventions for DD in 129 (20%) female and 517 (80%) male patients, which means that 1.9% of them were amputations.

Table II

Outcome data of the elective finger or ray amputations in the group with DD and the post-traumatic group with Visual Analogue Scales (VAS) for pain and satisfaction and Quick DASH scores, demonstrating similar levels of amputation and comparable outcome. (M = male, F = female, PIP = proximal interphalangeal joint, DIP = distal interphalangeal joint, MCP = metacarpal, R = right, L = left, phantom = phantom sensation, coldint = cold intolerance, postop = postoperative, y = years, m = months, P = phalanx, satisf = satisfaction)

no.	sex	age	ray	side	level	vas pain	vas satisf	dash
1	m	68	V	re	pip	0	8	2.3
2	m	69	IV	li	mc	5	6	9.1
3	m	49	V	re	pip	0	7.8	2.3
4	v	53	v	li	dip	0	5.6	13.6
5	m	53	v	li	mc	2	7	15.9
6	m	80	v	re	mc	2	5	15.9
7	m	50	v	li	mc	0	6	32
8	v	74	v	re	mc	5	5	40.9
trauma								
1	m	21	II	li	dip	5.6	6	50
2	v	44	IV	li	carpus	8	3	93.1
3	m	24	V	re	PIP	0	10	2.3
4	m	55	III	re	Mc	5.6	5.6	23
5	m	43	II	re	mc	5	7	22.7
6	m	60	II	li	mc	0	9	9.1
7	m	27	III	re	dip	5	8	11.4
8	m	30	II	li	mc	0	10	0

Of the 12 invited patients with DD, the primary amputated patient died 1.5 years after surgery, due to a myocardial infarction. Another patient could not reply, due to a traumatic brain injury and 2 patients were lost for follow-up. The remaining 8 patients filled in the scores (Table II). In this group, there were 5 ray (transmetacarpal) and 3 finger amputations, with a mean number of surgical interventions of 2.75 (range 2-4) and a mean time interval between the last surgery and the amputation of 18 months (range 1 m-60 m). Reasons for amputation were an 'en crochet' finger deformity in 6, with digital nerve injury in 2 and disabling pain in 2. One patient requested an amputation due to rapid recurrent flexion contracture of 90° in the PIP joint, which occurred twice, and 1 patient needed tip amputation after vascular injury and necrosis within 1 month. None of the patients regretted the decision to amputate and all mentioned a significant improvement compared to their preoperative status. Visual analogue score for pain was 1.8 (range 0-5) and satisfaction 6.3 (range 5-8). Quick DASH was 16.5 (range 2.3-40.9).

Of the 10 invited patients with post-traumatic elective finger amputation, 2 were lost for follow-up and 8 filled in the scores (Table II). In this group also, there were 5 ray (4 transmetacarpal, 1 with a carpal wedge osteotomy) and 3 finger amputations, with a similar mean total

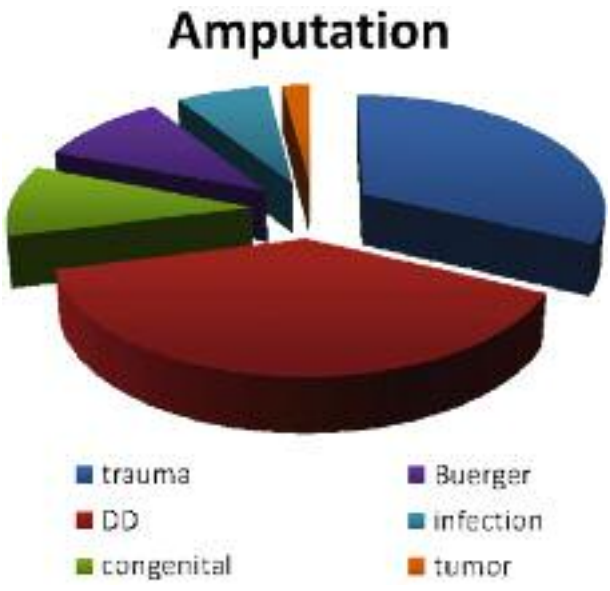

Fig. 1
Overview of the indications for elective finger or ray amputations in the adult patients during a 5-year time interval, demonstrating the overweight of Dupuytren's disease (DD).

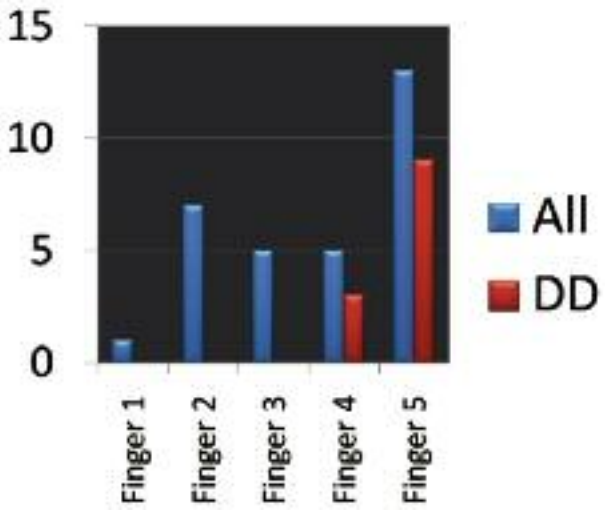

Fig. 3
Overview of ray involvement in elective finger/ ray amputation, illustrating that all rays are involved in elective amputation. In DD amputations however, amputations were confined to the 4th and 5th ray.

Fig. 2
Anterior clinical image of fifth ray amputation in recurrent surgery for Dupuytren's disease.

number of surgical interventions of 2.75 (range 2-5) and a somewhat shorter mean time interval of 9 months (range 3 m-21 m) between the last surgery and the amputation. One patient had an extreme time interval of 20 years and was not included in the calculated mean time interval, since his initial trauma occurred at the age of 7. The initial trauma was a fracture in 7 cases and a flexor tendon injury in 1. The reason for amputation was pain in 5 patients, with numbness and an 'en crochet' finger in 3. A crooked fracture non-union was seen in 2 and a painful ingrown nail with flexion deformity in 2. None regretted the decision to amputate and they all felt it had improved the pre-operative status. Visual analogue score for pain was 3.5 (range 0-8) and satisfaction 7.4 (range 3-10). Quick DASH was 26.5 (range 0-93.1).

No significant difference in amputation level, number of surgical interventions or outcome was seen between the group with DD or post-traumatic indication ($p \leq 0.2$).

Discussion

Recurrent DD can develop into a surgical challenge (1). In the literature, primary surgery complication numbers for DD are highly variable, with amputation risks as high as 9% in fifth finger surgery (9). Due to the spiral band leading to an anterior displacement of the neurovascular bundle in DD, digital nerves and vessels are at risk in surgical strand resection. In recurrent disease, these neurovascular structures are not only displaced, but also embedded in scar tissue, making surgery even more challenging (2). Moreover, previous surgery may have

damaged vascular structures of the finger, doubling surgical risks due to a single residual digital artery.

Although amputation surgery remains a last resort and an exceptional treatment method in Dupuytren's disease, it may be required in those cases with severe recurrent deformity (8, 10). The ideal level of amputation depends on occupational demands. In the younger and active, a metocarpophalangeal (MCP) joint disarticulation may be preferred for better grip and pinch force and preservation of the palm breadth (4, 8, 10). However, based on statistically disparate and physically inexplicable differences in functional outcome in relation to worker's compensation, PEIMER *et al.* (5) showed that even in young people ray resection results in a relatively good functional outcome with an 85% return to work. In general, border 2nd or 5th ray amputation and central 3rd or 4th ray amputation have the advantage of avoiding a defective finger with a gap hand and a socially more acceptable four-fingered hand (3, 6). Although proximal amputations carry a risk for neuroma and phantom pain, amputations distal to the MCP joint have a high risk for recurrent lack of extension (10). In this study, although different techniques were used, no conclusions can be drawn on the ideal level of amputation due to the small numbers. In general, prior to amputation other salvage procedures, as for example a proximal interphalangeal joint fusion, should always be considered in cases of pseudomotor changes, severe palmar fibrosis, previous operations and flexion deformity of over 70° (7).

In this study, we demonstrated that DD is the most common reason for the elective amputation of fingers or rays in adults in a hospital undertaking elective surgery only and which receives tertiary referrals from other hospitals. The risk for amputation is present both in male and female patients, since gender distribution is quite similar in both the surgical interventions and the amputations in DD. On the other hand, almost 2 out of a 100 surgical interventions for DD are amputation surgery and almost all are performed in recurrent DD. So, not only is DD one of the main causes for elective finger amputations in clinical practice, it is also 1 in 50 procedures in Dupuytren's surgery. On the other hand, the outcome of amputations in Dupuytren's disease is similar to the outcome seen in elective post-traumatic amputations with residual pain and satisfaction being somewhat unpredictable.

This study illustrates the clinical impact of severe DD, highlighting a dramatic surgical risk : the weight of amputation surgery. We believe the possibility of eventual amputation is imperative information to the patient before consenting to first-time surgery for DD.

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