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Total vs. Partial Aponeurectomy for Dupuytren's contracture – A literature review

Review Article

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Abstract: The etiology of Dupuytren's disease is controversial and thus the disease can only be treated when it presents with symptoms to warrant intervention. Surgical treatment is the method of choice to preserve hand dexterity and function. It is advisable to perform surgery at an early stage of disease progression, but various surgical techniques have been advocated. A partial fasciectomy is recommend by many authors, whereas a total aponeurectomy, where all palmar tissue is removed, might reduce the risk of recurrent disease due to the widespread removal of aponeurosis. The total aponeurectomy is performed less frequently due to the potential complications of this technique. In order to achieve an objective comparison of both surgical options we performed a literature meta-analysis, involving a comparison of surgical indications, results and complications following partial and total aponeurectomy, which are described in detail within this review article.

Keywords: *Dupuytren's disease • Operation • Complication • Outcome • Literature review*

1. Introduction

Dupuytren's disease is a benign fibromatous disease of the hand, which is often found in Great Britain, Ireland, Australia, Scandinavia and North America, but uncommon in South America, southern Europe and rare in Africa and China [1,2]. Prevalence varies between 2% and 42% [3-5]. Prevalence in Germany is about 2.3% with around 1.9 million Germans suffering from Dupuytren's contracture [6]. The etiology of Dupuytren's disease is controversial and thus the disease can only be treated when it presents with symptoms to warrant intervention. Surgical treatment is the method of choice to preserve hand dexterity and function [7]. It is advisable to perform surgery at an early stage of disease progression since Dupuytren's disease can lead to tendonopathy and joint contractures caused by articular capsule scarring.

According to RAYAN [8], surgery is indicated for flexion contractures of the metacarpophalangeal joints of >30° and flexion contractures of the proximal interphalangeal joints of >15°. Nevertheless, patient expectations, age, the aggressiveness and progression of Dupyutren's disease and hand function should always be considered prior to surgical treatment [9]. Various surgical techniques have been advocated. Many surgeons use a partial fasciectomy for the whole spectrum of Dupuytren's disease, which is defined as the removal of affected tissue only [8]. Although a total aponeurectomy, where all palmar tissue is removed, might reduce the risk of recurrent disease due to the widespread removal of aponeurosis, it is performed

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Table 1. Criteria for the comparison of different follow-ups.

	Satisfying (+)	Good (+ +)	Very good (+ + +)
Criterion "number of operated patients"	More than 50 patients	More than 150 patients	More than 250 patients
Criterion "mean postoperative period"	Two years or more	Three years or more	Five years or more

Table 2. Indications for total and partial aponeurectomy.

Total aponeurectomy	Partial aponeurectomy
Appropriate local and general conditions + contracture of no more than 45° at the joint affected most [20]	Contractures of more than 45° at the joint affected most [20]
Widespread disease [23,24]	Ulnar manifestation [23]
Aggressive, nodulous form of disease[25]	Limited manifestation [26]

less frequently due to the potential complications of this technique. Haematomas and injuries to the neurovascular bundle are encountered most frequently [10-13].

In order to achieve an objective comparison of both surgical options, we performed a literature meta-analysis, involving comparison of surgical indications, results and complications following partial and total aponeurectomy.

2. Techniques and Patients

Indications for partial and total aponeurectomy, as mentioned in the literature are summarised in Table 2. A total aponeurectomy begins with a palmar Y-shaped incision, with the proximal incision following the stomachic linea. The incision can be extended to the affected fingers, followed by neurolysis and arteriolysis. All palmar aponeurotic tissue including that from the thenar and hypothenar eminences is exposed and removed.

A partial fasciectomy begins with a vertical incision on the volar side of the affected finger, extending to the palm. Fascial tissue is exposed from the radial to the ulnar aspect and thereafter only apparently affected tissue is removed. As with total aponeurectomy, the wound is lavaged and closed and a drain is placed at the excision site, followed by application of bandages and dressings.

Seven clinical studies on partial fasciectomy and six studies on total aponeurectomy were included in our meta-analysis. We focused on the number of operated patients and the mean postoperative period to compare the results of different follow-up studies. The two largest studies on partial aponeurectomy were reported by GELDMACHER [14] (n=1565) and BRENNER [12] (n=383 patients). Other studies referred to in this meta-analysis involve patient numbers of between 58 and 129 [9,10,15-17]. The mean period between operation and review varied from 33 months to 10 years [9,15-17].

Since total aponeurectomy is not the method of choice for many surgeons, studies on this method tended to involve less patients than those for partial aponeurectomy, with BRENNER [12] (n=126) and SENNWALD [13] (n=103) reporting on the largest series. Other studies involved patient numbers of up to 91 [10,11,18,19]. The mean period between operation and review varied between 3-6 months and 47 months [11,13,18,19].

When comparing various results with different follow-up periods, ranges for the criterion "number of operated patients" were defined arbitrarily, whilst the ones for the criterion "mean postoperative period" were chosen with regard to results mentioned in the literature (Table 1). According to HUESTON [1] 87% of all recurrences occur during the first two years after the operation, whilst MILLESI [10,20] reported that 48% of the recurrences still occurred three years after the operation. TUBIANA and LECLERCQ [21] reported on 50% of the recurrences after 5 years and 65% after 10 years.

3. Results

When reviewing complications, GELDMACHER [14], having operated upon 1565 patients, reported nerve injury in 2.8% of his patients and arterial injury in 1.3%. Lesions of the neurovascular bundle were noticed in 1.4% of the patients in BRENNER's study [12] and in 3.4% in NOROTTE's study [16].

Haematoma were noticed in 1.16% [14], 2.35% [12] and 3.1% [10] of cases from various studies. The percentages for necrosis were 4.2% [12], 4.27% [14], 6.2% [10] and as high as 25.8% [16]. Other complications encountered were reported by GELDMACHER [14] who noticed algodystrophy in 2.18% of his patients, and MILLESI [10] who reported a rate of 4.65%. In

Table 3. Complications of partial fasciectomy.

	Number of operated patients	Lesions of the neurovascular bundle (%)	Haematoma (%)	Necrosis (%)	Algodystrophy(%)	Criterion "number of operated patients"
Geldmacher (1972)	1565	Nerves: 2.8 Arteries: 1.3	1.16	4.27	2.18	+ + +
Brenner (2002)	383	1.4	2.35	4.2	Not mentioned	+ + +
Millesi (1965)	129	Not mentioned	3.1	6.2	4.65	+
Norotte (1988)	58	3.4	Not mentioned	25.8	3.4	+

Table 4. Complications of total fasciectomy.

	Number of operated patients	Lesions of the neurovascular bundle (%)	Haematoma (%)	Necrosis (%)	Algodystrophy (%)	Criterion "number of operated patients"
Brenner (2002)	126	2.8	4.8	6.34	Not mentioned	+
Sennwald (1990)	103	Nerves: 9.7 Arteries: 9.7	2.91	0.97	17.5	+
Millesi (1965)	91	Not mentioned	7.7	12.1	5.5	+
Högemann et al. (2008)	61 (65 hands)	Nerves: 4.6	7.7	1.5	Not mentioned	+

Table 5. Results after partial fasciectomy.

	Average postoperative period	Number of operated patients	Recurrence rate (%)	Criterion "number of operated patients "	Criterion "postoperative period"
McGrouther (1999)	5 years	100	50	+	+ + +
Leclercq (1994)	10 years (8- 14 years)	50	66	+	+ + +
Mäkelä et al. (1991)	3.2 years	127 (153 hands)	27	+	+ +
De Maglio (1996)	33 months (6-59 months)	124	24.1	+	+

Table 6. Results after total fasciectomy.

	Average postoperative period	Number of operated patients	Recurrence rate (%)	Criterion "number of operated patients"	Criterion "postoperative period"
Langenberg (1987)	41 months	Less than 42	5	-	+ +
Sennwald (1990)	3-6 months	103	21.4	+	-
Brenner (1994)	47 months	48	39.7	-	+ +
Högemann et al. (2008)	41 months (1.03- 6.39 years)	61 (65 hands)	10.8	+	+ +

NOROTTE's study [16] 3.4% of the patients suffered from algodystrophy.

Lesions of the neurovascular bundle tend to occur slightly more frequently in total aponeurectomy. BRENNER [12] reported a rate of 2.8%, whilst HÖGEMANN et al. [11] found a nerve lesion in 4.6% of patients. Nerval and arterial lesions were found in 9.7% in SENNWALD's study [13].

Haematoma were noticed in 2.91% [13], 4.8% [12] and 7.7% [10,11]. Rates for necrosis varied amongst 0.97% [13], 1.5% [11], 6.34% [12] and 12.1% [10]. Algodystrophy was seen in 5.5% [10] and 17.5% [13] of the patients after total aponeurectomy.

With regard to recurrence, rates such as 24.1% [17], 27% [15], 50% [9] and 71% [16] were reported after partial aponeurectomy. Recurrence rates after total aponeurectomy varied amongst 5% [18], 10.8% [11], 21.4% [13] and 39.7% [19]. Tables 3-6 give an overview of complications and outcomes.

4. Discussion

The perceived advantage of total aponeurectomy over partial aponeurectomy is the perceived lower risk of recurrence and therefore revision surgery. Indeed, reported recurrence rates after total fasciectomy (Table 6) were lower than the ones after partial aponeurectomy (Table 5). Rates after partial fasciectomy varied from 24.1% to 71% [9,15-17], whilst rates between 5% and 39.7% were reported after total fasciectomy [11,13,18,19]. However, the mean periods between partial aponeurectomy and review varied between 33 months and ten years [9,15-17] and were longer than those reported for total aponeurectomy which varied between 3-6 months and 47 months [11,13,18,19]. This, of course, begs the question of whether or not recurrence rates for total aponeurectomy might have been higher if patients had been examined at a later time. Nevertheless, even if recurrence rates for total aponeurectomy were higher, total aponeurectomy would still provide patients with a lower risk of recurrent disease than partial aponeurectomy.

As per the figures cited in tables 3 and 4, total aponeurectomy tends to increase the risk of haematoma formation, with rates between 2.91% and 7.7% [10-13] in contrast to rates between 1.16% and 3.1% [10,12,14] for partial aponeurectomy. Algodystrophy was seen in 5.5% [10] and 17.5% [13] post-total aponeurectomy, whilst rates between 2.18% and 4.65% [10,14,16] were reported after partial aponeurectomy. The increased risk of haematoma and algodystrophy is probably due to the more extensive removal of palmar tissue with total aponeurectomy.

The risk of neurovascular bundle injury also tends to be lower in partial aponeurectomy. Rates after partial fasciectomy varied between 1.4% and 3.4% [12,14,16] in contrast to rates between 2.8% and 9.7% [11-13] after total aponeurectomy. However, the risk of neurovascular bundle injury certainly also depends to a large extent on the surgeon's ability and experience. Low and high rates for necrosis were reported after total aponeurectomy as well as after partial aponeurectomy. Studies on partial aponeurectomy reported rates between 4.2% and 25.8% [10,12,14,16], whilst rates between 0.97% and 12.1% [10-13] were mentioned after total aponeurectomy.

In our opinion having reviewed the literature thoroughly, the choice of partial or total aponeurectomy should strongly depend on the age and progression of the disease. We advise paying close attention to the history of disease progression and treating patients at an early stage of disease by means of total aponeurectomy. Surgery should be performed for stage 2 disease according to Iselin's classification [22]. Meanwhile surgery for stage 1 disease should only be performed if a patient suffers constant pain due to nerve irritation, for the disease may arrest in this stage. Performance of a total aponeurectomy for stage 2 disease provides patients with a low risk of recurrence and a lower risk of neurovascular bundle injury and necrosis than at a later stage. In stage 3 disease and especially in stage 4 disease, the progression of the disease typically results in more difficult local conditions and therefore a more difficult surgery, which might increase the risk of neurovascular injury, haematoma and necrosis [11]. Furthermore, a complete removal of all palmar tissue becomes almost impossible and recurrent disease therefore more likely than at an earlier stage of disease. Later forms of disease should rather be treated by partial fasciectomy especially for older patients, who will rarely need a second surgical intervention because of their age. Current literature is still not in favour of any technique. We have conducted our own study that revealed good results from the total technique, but comparative studies have also shown good results from the partial technique. Prospective larger studies comparing both groups with similar long-term follow-up are required.

References

[1] Hueston JT., Dupuytren's diathesis, In: Hueston JT. (Ed.), Dupuytren's contracture, Livingstone, Edinburgh, 1963, 51-63, E45

[2] McFarlane R., Clinical perspective: On the origin and spread of Dupuytren's disease, J Hand Surg (Am), 2002, 27A, 385-90

[3] Ross D., Epidemiology of Dupuytren's disease, Hand Clin, 1999, 15, 53-62

[4] Ling R. , The genetic factor in Dupuytren's disease, J Bone Joint Surg (Br), 1963, 45, 709-18

[5] Mikkelsen O., Epidemiology in a Norwegian population, In: McFarlane RM., McGrouther DA., Flint MH. (Eds.), Dupuytren's disease: biology and treatment, Churchill Livingstone, New York Edinburgh Melbourne, 1990,191-200

[6] Brenner P., Krause-Bergmann A., Ha Van V., Die Dupuytrensche Kontraktur in Norddeutschland – Epidemiologische Erfassungsstudie anhand von 500 Fällen, Unfallchirurg, 2001, 104, 303-11

[7] Berger A., Flory P., Brenner P., Clinical aspects and surgical treatment of Dupuytren contracture, Unfallchirurg, 1990, 93, 181-85

[8] Rayan G., Dupuytren disease: Anatomy, Pathology, Presentation, and Treatment, J Bone Joint Surg

(Am), 2007, 89, 189-98
[9] McGrouther D., Dupuytren's contracture, In: Green DP., Hotchkiss RN., Pederson WC. (Eds.), Green's operative hand surgery, Churchill Livingstone, New York, Edinburgh, London, 1999, 563-91
[10] Millesi H., Zur Pathogenese und Therapie der Dupuytrenschen Kontraktur (eine Studie an Hand von mehr als 500 Fällen), Ergebnisse der Orthopädie, 1965, 47, 51-101
[11] Högemann A., Wolfhard U., Kendoff D., Board T., Olivier L., Results of total aponeurectomy for Dupuytren's contracture in 61 patients: a retrospective clinical study, Arch Orthop Trauma Surg, 2009, 129(2), 195-201
[12] Brenner P., Dupuytren's disease of ring and little finger, Orthop Traumatol, 2002, 10, 138-58
[13] Sennwald G., Fasciectomy for treatment of Dupuytren's disease and early complications, J Hand Surg, 1990, 15A, 755-61
[14] Geldmacher J., Die Eingriffe bei der Dupuytrenschen Kontraktur, In: Zenker R., Heberer G., Hegemann G. (Eds.), Allgemeine und spezielle Operationslehre, Vol. 10, Part III, Springer, Berlin Heidelberg New York, 1972, 441-74
[15] Mäkelä E., Jaroma H., Harju A., Anttila S., Vainio J., Dupuytren's contracture: The long term results after day surgery, J Hand Surg (Br), 1991, 16B, 272-74
[16] Norotte G., Apoil A., Travers V., Résultat à plus de dix ans de la maladie de Dupuytren. A propos de cinquante-huit observations, Ann Chir Main, 1988, 7, 277-81
[17] De Maglio A., Timo R., Feliziani G., Recidive ed estensioni nel morbo di Dupuytren trattato con aponeurectomia selettiva. Revisioni clinica di 124 casi, Chir Organi Mov, 1996, 86, 43-8
[18] Langenberg R., Dupuytren's contracture – is partial palmar aponeurectomy still justifiable?, Zentralbl Chir, 1987, 112, 769-75
[19] Brenner P., Mailänder P., Berger A., Epidemiology of Dupuytren's disease, In: Berger A., Delbrück A., Brenner P., Hinzmann R. (Eds.), Dupuytren's disease. Pathobiochemistry and clinical management, Springer, Berlin Heidelberg New York, 1994, 244-54
[20] Millesi H., Dupuytren-Kontraktur, In: Nigst H., Buck-Gramcko D., Millesi H. (Eds.), Handchirurgie. Allgemeines, Wahloperationen, Vol. 1, Thieme, Stuttgart, 1981
[21] Tubiana R., Leclercq C., Les récidives de la maladie de Dupuytren, In: Tubiana R., Hueston JT. (Eds.), La maladie de Dupuytren, Expansion Scientifique Francaise, Paris, 1986, 203-07
[22] Iselin F., Cardenas-Baron L., Gouget-Audry I., Peze W., La maladie de Dupuytren dorsale, Ann Chir Main, 1988 1988, 7, 247-50
[23] Belusa M., Schmickaly J., Die Dupuytren-Kontraktur - Lehren und Erfahrungen, Beitr Orthop Traumatol, 1988, 10, 473-83
[24] Falter F., Herndl E., Mühlbauer W., Dupuytrensche Kontraktur. Wann operieren? Konservative Vorbehandlung?, Fortschr Med, 199, 109(10), 223-26
[25] Brug E., Göhrlich W., Die Dupuytrensche Kontraktur. Ergebnisse nach operativer Behandlung, Chir. Praxis, 1981, 28, 637-41
[26] Buck-Gramcko D., Hoffmann R., Neumann R., Die Handchirurgische Sprechstunde., 2nd ed., Hippokrates, Stuttgart, 1992