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REVIEW ARTICLE
Hand/Peripheral Nerve

Needle Fasciotomy or Collagenase Injection in the Treatment of Dupuytren's Contracture: A Retrospective Study

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Background: Dupuytren's contracture is common among older people in Sweden. Previous studies comparing the treatment with an injection of collagenase with percutaneous needle fasciotomy found no differences.
Methods: We retrospectively compared the degree of improvement in the deficit in extension of the joints in 2 groups of patients who had been treated with collagenase (71 fingers) or needle fasciotomy (109 fingers) before and 1 year after treatment. We compared the improvement of the extension deficit among the metacarpophalangeal (MCP) and proximal interphalangeal joints before and after the intervention; additionally, the level of improvement was classified into 3 levels (mild = 0° to 29°; moderate = 30° to 60°; considerable = 61° and more).
Results: The degree of improvement of extension in the MCP joints was 11° greater in the collagenase group ($P = 0.001$). The number of patients who had an improvement of >60° (considerable) in extension was greater in the collagenase group ($P = 0.02$).
Conclusion: Collagenase was more effective than needle fasciotomy in treating extension deficits of the MCP joints in Dupuytren's contracture in this retrospective analysis. Further prospective studies are required to confirm the finding.
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INTRODUCTION

Dupuytren's contracture is a benign fibroproliferative disease. It develops in about 6% of the older population in Sweden.[1] Benign fibromatosis develops in the palmar fascia of the hands and fingers in the form of tough bands in the subdermal level causing flexion contractures, which limit the extension of the affected finger.

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In 1979, Lermusiaux and Debeyre[2] described the use of a needle as a substitute for a blade to disrupt the tough fibrous bands. The method apparently found general acceptance because it is less invasive than open excision, and the function of the hand is usually restored quickly.[3–5] Foucher et al[3] reported good results, especially for the treatment of the metacarpophalangeal (MCP) joints with a reoperation rate of 24% among the 311 treated fingers. Badois et al[6] showed that the recurrence rate was 50% among the 123 hands that were assessed 5 years after treatment. Similar results were reported by van Rijssen et al[4] who showed that 50% of the patients remained free of recurrence for a mean of 4.4 years after treatment; however, that study included only 40 fingers.

In 2009, collagenase clostridium histolyticum was introduced as an efficient method of treatment of Dupuytren's contracture, with an overall improvement rate of 64%.[7] The use of collagenase increased the total number of patients treated in parallel to a decrease in the number of open fasciectomies.[8]

Collagenase treatment and needle fasciotomy have some characteristics in common. Both are less invasive than open surgery, so they can be done in the outpatient clinic. In contrast to open surgery, both methods disrupt the cord while leaving the bulk of the pathologic collagen intact.[8–11]

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There have been studies that compared the outcome after the treatment with collagenase or needle fasciotomy, and most of these reports showed no difference in outcome after 1 year's follow-up.[11,12] As both techniques are commonly used at our center with varying results depending on the patient's age and the surgical technique used, we wanted to compare retrospectively the degree of improvement in the extension deficits of the affected joints, particularly in the MCP and proximal interphalangeal (PIP) joints.

METHODS

For this retrospective study, we retrieved the medical records of the patients who were treated with either collagenase or needle fasciotomy during 2011–2016 at the department of Hand Surgery, Plastic Surgery and Burns.

All patients who had records for measurements of MCP or PIP were included. The measurements were done immediately before the treatment and 1 year after by trained occupational therapists. We excluded the patients who had missing preoperative measurements of the finger joints.

Active extension of the isolated finger joints in the affected finger was measured with a goniometer according to guidelines.[13] The amount of improvement was the difference between the angle measured before the intervention and that measured one year afterwards, and it was classified into three: mild = 0°–29°; moderate = 30°–60°; and considerable = 61° and more.[14]

The following variables were recorded as follows: age in years, age groups (42–59, 60–70, and 80–88 years), sex, diabetes, side, extension deficits among the joints (MCP and PIP) in degrees° before and after the intervention, follow-up period, treatment group (needle fasciotomy or collagenase), the degree of improvement in the extension deficit in degrees°, and occurrence of complications such as hematoma and complex regional pain syndrome during or after the intervention. The study was approved by the Central Ethical Review Board (2019-00438). No written consent was obtained from the patients.

All patients were examined by a specialist in hand surgery before treatment and counseled about the procedure to be done, possible complications, and outcome. According to the national guidelines for treatment in public healthcare, extension deficits of 45° or more in one or more joints for the same finger were an indication for treatment. Two experienced consultants did all treatments.

Techniques

Needle Fasciotomy

Percutaneous needle fasciotomy is an outpatient procedure that is done under local anesthesia (carbocain 1% + adrenaline) in which the fibrous cords that present in the palm or the finger, or both, are divided using a beveled needle (18 G) with a slow, sawing motion. It continues until the finger is fully extended.[11,15]

Collagenase Clostridium Histolyticum Injection

The procedure is done in the outpatient clinic. The drug (Xiapex, SOBI, Solna, Sweden) was reconstituted to the correct dose (0.58 mg) and injected directly into the palpable cords using the needle supplied (29 G). The treated fingers were extended at 3 days after the injection to rupture the cord, which was done under an ulnar or median nerve block, or both.

Hand Therapy

Hand therapy was similar for both groups. Immediately after needle fasciotomy, or extension of the finger after injection of collagenase, patients were instructed to wear a splint 24 h/d for the first 3 days. Four days after treatment, the splint was used only during the night for a period of 3 months. The patients were instructed to do active exercises with both isolated joint movements.

Statistics

Data are presented as mean (SD), number (%), or number and were analyzed with the help of Statistica software (version 13, Dell Inc., Tulsa, OK). Probabilities of <0.05 were accepted as significant. Distribution was tested with the Lilliefors test for normality, and the significance of differences between the groups was assessed with the t test for independent samples or the $\chi 2$ test, as appropriate. The significance of differences between extension deficit before and after operation was assessed using the t test for dependent samples. Main effects analysis of variance was used to analyze the effect of treatment among the different age groups, with the t test for independent groups for posthoc analysis.

RESULTS

Table 1 shows the differences between the 2 groups including the mean baseline extension deficit and the number of joints and fingers included. The extension deficit of the MCP in the collagenase group was greater than that in the needle fasciotomy group, the mean difference being 8°.

Both groups had a reduced angle extension deficit when the baseline measurements were compared with the long-term follow-up results, but the improvement of extension in the MCP joints was much greater in the collagenase group (mean 41°, SD 20° compared with 30°, SD 20° [$P = 0.001$]). The 2 techniques achieved comparable results in the PIP joint (Table 2).

Half of the patients in the 2 treatment groups had moderate improvement in extension of their MCP joints, while the number of patients with considerable (>60°) improvement in extension was bigger in the collagenase (10/64) than in the needle fasciotomy (4/90) group ($P = 0.02$) (Table 3 and Fig. 1).

Two patients developed a complex regional pain syndrome after the treatment, one in each group. One patient developed an infection, whereas 11 patients had hematomas after the needle fasciotomy which was resolved within a week. The skin ruptured at forced extension in both groups—8/109 in the needle fasciotomy group (7%)

Table 1. Details of the Study Group

	All (n = 157)	Needle Fasciotomy (n = 98)	Collagenase (n = 59)	*P*
Age, y	69 (9)	69 (10)	70 (8)	0.52*
No. fingers	180	109	71	—
Follow-up, mo	14.3 (2.7)	14.7 (3.4)	13.7 (0.9)	0.03*
Sex, male	133 (85)	87 (89)	46 (78)	0.07†
Diabetes	25	18 (18)	7 (12)	0.28†
Baseline MCP deficit (degree)	52 (17)	49 (15)	57 (17)	0.004*
Baseline PIP deficit (degree)	49 (21)	47 (20)	53 (23)	0.25*
Baseline MCP + PIP deficit (degree)	83 (31)	77 (28)	92 (33)	0.002*
MCP, no. joints	154	90	64	—
PIP, no. joints	122	74	48	—
Digit, numbers				—
Dig II	1	1	0	
Dig III	13	8	5	
Dig IV	57	40	17	
Dig V	109	60	49	

Data are presented as number (%) or
*mean (SD), *t* test (groups). †χ^2 test.

Table 2. Difference in Active Extension Deficit before and 1 Year after the Treatment

	MCP			PIP		
	Preoperative (Degree)	Postoperative (Degree)	*P**	Preoperative (Degree)	Postoperative (Degree)	*P**
All	52 (17)	18 (18)	<0.001	49 (21)	34 (21)	<0.001
Needle fasciotomy	49 (15)	19 (17)	<0.001	47 (20)	35 (20)	<0.001
Collagenase	57 (17)	16 (19)	<0.001	53 (23)	34 (23)	<0.001
	Change (Degree)		*P*†	Change (Degree)		*P*†
All	34 (21)			15 (21)		
Needle fasciotomy	30 (20)		0.001	12 (20)		0.09
Collagenase	41 (20)			19 (21)		

Data are mean degree (SD).
**t* test (dependent samples) for the difference between preoperative and postoperative measurements. †*t* test (independent samples) for the difference in change between the 2 groups.

Table 3. Degrees of Change in Active Extension Deficit among the Study Group

		Needle Fasciotomy		Collagenase	
		MCP	PIP	MCP	PIP
Mild	(0°–29°)	37 (41)	62 (84)	19 (30)	36 (75)
Moderate	(30°–60°)	49 (54)	10 (14)	35 (55)	10 (21)
Considerable	(≥61°)	4 (4)	2 (3)	10 (16)	2 (4)

Data are shown as number of joints (%).

and 26/71 (37%) in the collagenase group—all of which healed spontaneously within 3 weeks. There were no reported incidences of nerve or tendon injuries in either of the 2 groups.

When we analyzed the improvement in the extension deficit in the different age groups, there was a difference between the treatment groups ($P = 0.003$); additionally, posthoc analysis showed that extension deficits were improved to a greater extent by treatment with collagenase than with needle fasciotomy in the MCP joint in the second age group (60–79 years) ($P = 0.007$). The differences in extension deficits in the MCP joint among the other age groups were not significant ($P = 0.07$ and 0.72, respectively). There was no difference between the treatment groups in the improvement of the extension deficit in the PIP joint among different age groups ($P = 0.16$) (Fig. 2).

DISCUSSION

This study evaluated 2 different treatments for Dupuytren's contracture, both of which had resulted in improvement in correcting extension deficits in MCP and PIP joints. Although larger extension deficits were noted in the collagenase group than in the needle fasciotomy group, the magnitude of improvement in the MCP joint was greater in the collagenase group.

The number of treatments for Dupuytren's contractures increased significantly after the introduction of collagenase[8] and was also associated with a reduction in the number of operations to treat the same disease, thereby saving resources with comparable outcomes.[7,16,17]

At the level of the MCP joints, the collagenase resulted in more improvement in extension deficits than needle fasciotomy, contrary to the studies by Skov et al[9] and

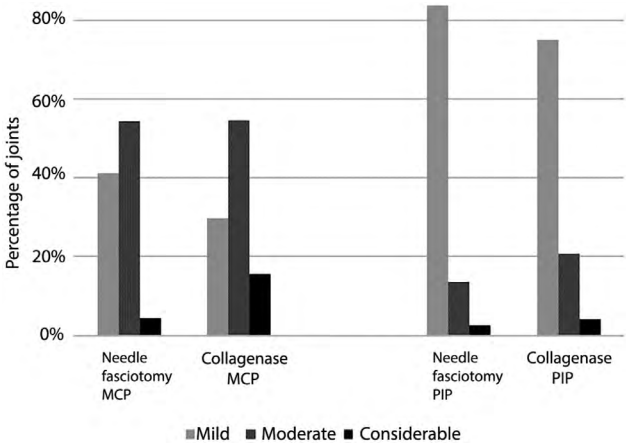

Fig. 1. The percentage of joints by treatment group (needle fasciotomy and collagenase) that showed mild (0°–29°), moderate (30°–60°), and considerable (≥61°) improvement in MCP and PIP extension deficit.

Strömberg et al[11] that showed no superiority of collagenase over needle fasciotomy; however, it is difficult to compare between the studies as the outcome was calculated in different ways. In addition, there were more recurrences and complications in the collagenase group. In another study by Scherman et al,[12] most of the joints included were MCP joints in which the improvement was noted in both the collagenase and needle fasciotomy groups, but collagenase was no better than needle fasciotomy. Complications such as skin fissures were noted in both groups, with more in the collagenase group, which is in line with our findings. The complications were managed according to the clinical protocols in the department. Regional pain syndrome was treated medically and followed up with the support of the department of pain management. Wound infections were treated with systemic antibiotics and local wound care based on wound culture results. The hematomas were treated conservatively, and the skin ruptures

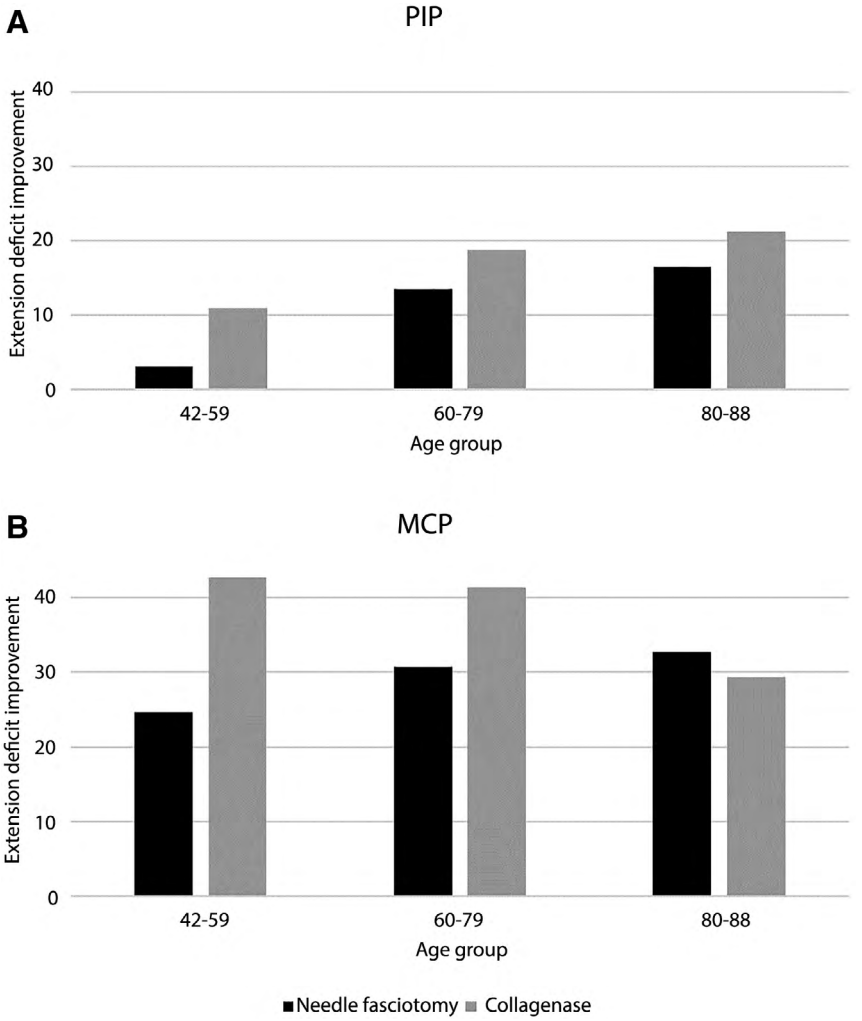

Fig. 2. The improvement in extension deficit (degree) in PIP (A) and MCP (B) joints in the different age groups. The number of PIP joints in each group (each bar) was 12, 3, 52, 39, 10, and 6 (from left to right), and the number of MCP joints was 17, 6, 59, 53, 14, and 5.

were treated conservatively with wound dressings until healing.

Regardless of the advantages of collagenase in the final results, it is an expensive choice compared with needle fasciotomy. Both techniques are usually done as minor procedures, and the preparation is to a great extent similar, except that the collagenase is expensive.[11] The patient also requires another visit to the clinic 3 days after the injection to straighten the affected finger.

We have not considered the recurrence rate[17,18]; however, many studies have used the cut-off point of a 20° worsening of the contracture in a joint, but the timing of the baseline measurement varies among studies and it is also not clear whether the extension deficit was measured actively or passively.[9,10,12] It would be hard to get a valid definition of recurrence in this context, so we preferred to present the difference in improvement between the preoperative and the 1-year follow-up measures.

LIMITATIONS

The retrospective nature of this study and the relatively short-term follow-up are limitations, although similar follow-up periods have been used in other studies.[11,12] It has been suggested that the follow-up time should be 3–5 years to capture the true recurrence rate,[17,19] although the progression of the disease seems to be linear,[17] which indicates that results of similar duration can be compared with each other.

The selection of patients based on the clinical evaluation of the treating physician is a disadvantage because of the lack of randomization. This can be a source of bias and so the findings of the study should be judged with caution.

Finally, the better response with collagenase shown in a certain age group might be due to unequal distribution of the subgroups, which lead to insufficient power to achieve significance in the groups with smaller number of patients. Therefore, this finding should be interpreted with caution.

CONCLUSION

Collagenase was more effective than needle fasciotomy in treating extension deficit in Dupuytren's contracture of the MCP joints, but this conclusion is based on a retrospective analysis of data and further prospective studies are required to confirm this finding.

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