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Dupuytren contracture: comparative study between partial fasciectomy and percutaneous fasciectomy ☆

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ABSTRACT

Objectives: To compare the clinical results obtained by using the techniques of open limited fasciectomy (FP) and percutaneous needle fasciectomy (FPC) in patients with Dupuytren's contracture after one year follow up.

Methods: Thirty-three patients and a total of 50 fingers with Dupuytren's contracture were divided non-randomly and evaluated after undergoing procedures with FP or FPC. The results were evaluated based on the Tubiana classification, DASH score (Disabilities of the Arm, Shoulder, and Hand), time until return to professional activities, total passive extension deficit (DTEP), the relationship between the extension deficit and DASH, recurrence and complications.

Results: Twenty-six fingers were treated with FPC technique and 24 fingers with FP. The DTEP was significantly lower in FP group (10.23°) when compared to FPC group (23.46°) at 12 months postoperatively ($p = 0.038$). The remaining items assessed did not show any statistically significant differences.

Conclusion: Total passive extension deficit at 12 months is lower in the group of open limited fasciectomy. There are no significant differences between groups FP and FPC over the classification of Tubiana, the DASH score, time until return to professional activities and the incidence of recurrence.

Contratura de Dupuytren: estudo comparativo entre fasciectomia parcial e fasciotomia percutânea

RESUMO

Objetivos: Comparar os resultados clínicos das técnicas de fasciectomia parcial (FP) e fasciotomia percutânea (FPC) em pacientes acometidos pela contratura de Dupuytren com seguimento de um ano.

operatórios

Estudo comparativo

Métodos: Trinta e três pacientes e 50 dedos com a contratura de Dupuytren foram divididos de forma não randomizada e avaliados após serem submetidos à FP ou à FPC. As avaliações incluíram a classificação de Tubiana, o escore funcional DASH (Disabilities of the Arm, Shoulder, and Hand), o tempo de retorno às atividades profissionais, o déficit total de extensão passiva (DTEP), a relação entre o DTEP e o escore DASH, a recidiva e as complicações.

Resultados: No total, 26 dedos foram tratados pela técnica de FPC e 24 pela de FP. O DTEP apresentou-se significativamente menor no grupo da FP (10,23°) em relação ao grupo da FPC (23,46°), aos 12 meses (*p* = 0,038). Os demais itens avaliados não apresentaram diferenças estatisticamente significativas.

Conclusão: O déficit total de extensão passiva, aos 12 meses, é menor no grupo da FP. Não existem diferenças significativas entre os grupos FP e FPC quanto à classificação de Tubiana, ao escore DASH, ao tempo de retorno às atividades profissionais e à incidência de recidiva.

Introduction

Dupuytren's contracture is a benign fibromatosis that affects the palmar and digital fasciae, with formation of nodules and cords. It may progress to contracture of the interdigital spaces and flexion deformity of the metacarpophalangeal (MCP), proximal interphalangeal (PIP) and, more rarely, distal interphalangeal (DIP) joints.[1,2]

Surgery is indicated in the presence of contractures of the MCP joint greater than 30°, any degree of contracture of the PIP or DIP joints and also in the presence of painful nodules.[1,2]

One alternative to surgical treatment is injection of collagenase, an enzyme derived from the bacterium *Clostridium histolyticum*. In other cases, the treatment consists of observation of the degree of progression of the disease until there is a need for intervention.[1,2]

The following techniques have been described for surgical treatment of Dupuytren's contracture: total fasciectomy (TF), partial fasciectomy (PF), dermofasciectomy (DF) and percutaneous fasciectomy (PCF).

TF[3] consists of complete excision of the palmar and digital fasciae and is a proscribed treatment because of the high incidence of complications (skin necrosis) and, notwithstanding this, without diminishing the recurrence rates.[2]

PF, which was described by McGrouther,[2] consists of resection only of the palmar and digital fasciae that have been affected.[2,4]

In DF, in addition to the fascia, the thin adherent overlying skin that does not have subcutaneous cellular tissue is also removed. The defect is covered using a total skin graft when necessary. DF is indicated more for cases of greater severity in younger patients.[5,6]

PCF was described by Astley-Cooper in 1822 and was reintroduced in the 1970s. It consists of sectioning the cords using a needle, without any formal incision in the skin.[2,7–9]

The surgical technique indicated for treating Dupuytren's contracture depends on the experience and preferences of each surgeon, since there are advantages and disadvantages for each of them. Among the techniques, two of them stand out because of their frequency of use: PF and PCF.

PF makes it possible to view the tissues affected and the neurovascular bundles, and also to perform capsulotomy in cases of joint contracture. PF presents more extensive dissection, greater duration of surgery and risks of infection and skin necrosis.[3,10,11]

PCF has the advantage of being faster and less invasive, and can even be done as an outpatient procedure, using local anesthesia. However, it presents greater recurrence rates.[12–15] The literature mostly comprises studies on series of cases of these techniques separately. The ideal would be to have controlled studies in order to compare the different surgical techniques and their best indications.

The aim of the present study was to conduct a controlled and comparative study on the clinical results obtained through using the PF and PCF techniques, in a series of cases of patients with Dupuytren's contracture.

Methods

The present study was submitted to our institution's ethics committee and was approved.

It consisted of a non-randomized controlled clinical study with two parallel groups of patients with Dupuytren's contracture.

The inclusion criteria were: indication of surgical treatment in skeletally mature patients who, after receiving explanations about the study, agreed to participate and signed a free and informed consent statement.

Patients who had previously undergone some form of surgical treatment for the same pathological condition, or who presented other diseases affecting the upper limb under examination that might prejudice the results from the evaluations, were excluded.

The following personal details were noted down: sex, laterality, side affected, type of activity (light, moderate or heavy) and fingers affected.

For each finger affected, the preoperative assessment consisted of measuring the total passive extension deficit (TPED), which was the sum of the extension deficits of the MCP and interphalangeal joints.

The Tubiana classification was used. This divided the fingers into four groups according to their TPED. When the PIP joint presented any degree of contracture, the sign (+) was added (Table 1).

Table 1 – Tubiana classification.

Grade	TPED	Involvement of PIP
I	0–45°	+
II	46–90°	+
III	91–135°	+
IV	>135°	+

Source: Hospital Nossa Senhora do Pari.

The patients were divided into two intervention groups (PF and PCF), according to each surgeon's personal criteria, independent of the severity to which the finger was affected.

To evaluate the functional results from the affected upper limb, the DASH protocol was used. This was applied in the sixth postoperative month. A final score of zero represented absence of functional incapacity and a score of 100 represented complete incapacity.[16]

The length of follow-up for all the patients was 12 months.

Surgical technique

Partial fasciectomy

All the patients underwent this procedure in a surgical environment, under anesthesia consisting of brachial plexus block. They were positioned in horizontal dorsal decubitus with the upper limb in a supine position, under exsanguination (Fig. 1).

On the palm of the hand, a Bruner incision or zetaplasty longitudinally to the cord was used, and this was extended to the fingers when necessary (Fig. 2). After mobilization of the skin flaps, all the pathological cords were identified with the aid of magnification (Fig. 3).

Care was taken to preserve the neurovascular bundles and flexor tendons for subsequent excision of the cord and release of all of the contracture of the finger (Figs. 4 and 5).

In cases in which contracture of the PIP joint was also present, capsulotomy was performed through the same incision.
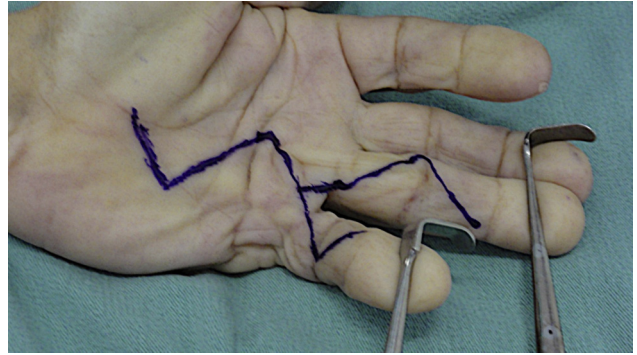
After the procedure, a sterile dressing and a volar plaster-cast splint were applied, with the fingers kept extended.
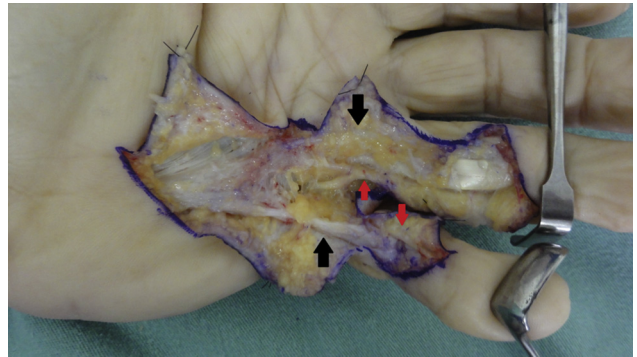
Percutaneous fasciectomy

PCF was also performed in a surgical environment, but under local anesthesia using 2% lidocaine.

Figure 1 – Preoperative appearance with contracture of the MCP of the ring finger and the MCP and PIP of the little finger.

Figure 2 – Planning for Bruner incision extending to the ring and little fingers.

Figure 3 – Identification of the cords (black arrows) with the neurovascular bundles displayed (red arrows).
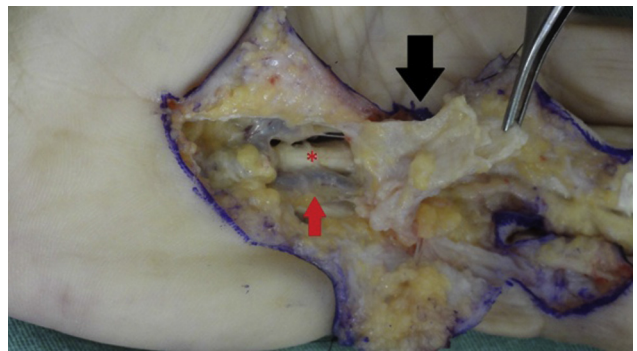
Figure 4 – Elevation of the cord (black arrow), showing the proximity of the neurovascular bundle (red arrow) and flexor tendons (*).

Figure 5 – Excision of all of the tissue affected, with full extension of the fingers.

Figure 6 – Preoperative appearance showing contracture of the MCP of the ring finger.

All the cords responsible for the contracture were palpated and sectioned at various levels, in the palm of the hand and in the fingers, when present.

Sectioning of the cords was done by introducing a non-mounted 40×12 needle, with oscillatory movements in a direction perpendicular to the cords. Throughout the procedure, care was taken to subject the finger to gentle extension force, so as to better identify the cord that was to be sectioned, and to avoid needle penetration into an inappropriate location and prevent vessel and nerve injuries.

Care was also taken not to make an incision beyond the depth of the bezel itself, so as to avoid injury to the tendons.

At each sectioning of the cord, treated proximally to distally, progressive extension of all the joints was achieved. The cord was sectioned as many times as necessary.

In cases in which small residual areas remained after maximum extension of the fingers had been achieved, these areas were left open for second-intention healing.

The procedure was considered to have finished when it was no longer possible to palpate any tension along the path of the cord (Figs. 6 and 7).

After applying a sterile dressing, the hand was immobilized using a volar plaster-cast splint, with the fingers kept extended.

Figure 7 – Extension of the finger obtained by means of the PCF technique. The yellow arrow shows the direction of the oscillatory movements of the needle for sectioning the cord at several levels.

Figure 8 – Use of brace with extension of the MCP and interphalangeal joints, in order to maintain the correction achieved.

Postoperative period

In both techniques, the first change of dressings was done after five days. All the patients used a static brace that was constructed by a hand therapist, with extension of the MCP and interphalangeal joints (Fig. 8).

Use of the brace was started after the operative wounds had healed and was maintained for four months. It was removed a few times per day for active exercises to be performed, so as to avoid contractures. After this period, the brace was used at night for another four months.

Evaluation criteria

Evaluations were made in the first, third, sixth and twelfth months after the operation.

In the patients with more than one finger affected, each finger was considered separately for the purposes of statistical calculations. A single therapist performed all the evaluations, based on the following criteria:

- Classification of the contractures as described by Tubiana.
- DASH functional questionnaire.
- Time taken to return to professional activities.
- Total passive extension deficit (TPED).
- Recurrence of the pathological condition – defined as loss of the correction achieved that was greater than 20°.[17]
- Correlation of TPED with the DASH score.
- Correlation of the types (+) of the Tubiana classification with recurrences.

Data analysis

Data from the clinical trial were gathered on a standardized form and were transferred to a spreadsheet in the Microsoft Office 2010 software.

First, the characteristics of the patients who participated in the study were analyzed descriptively and inferentially in order to ascertain the similarities between the groups.

Table 2 – Distribution of preoperative data on the PF and PCF groups in relation to the number of patients, number of fingers operated, sex, activity, laterality (R, right; L, left), side affected and fingers affected (II, index; III, middle; IV, ring; V, little).			
	PF	PCF	*p* value
Number of patients	17	16	
Number of fingers	24	26	
Male sex (%)	94%	88%	
Activity (light/moderate/heavy)	8/3/13	9/10/7	0.062
Laterality (R/L)	24/0	25/1	1
Side affected (R/L/bilateral)	12/8/4	5/18/3	0.033
Fingers affected (II/III/IV/V)	1/1/10/12	2/6/9/9	0.230
Source: Hospital Nossa Senhora do Pari.			

The data were analyzed through comparisons between the PF and PCF groups.

Continuous data were subjected to the Kolmogorov–Smirnov test of normality of distribution.

The data that presented normal distribution were analyzed by means of Student's *t* test and, when this was not possible, the nonparametric Mann–Whitney *U* test for comparison of independent pairs was used.

For the categorical data, the chi-square test was used to investigate the differences in the proportions of occurrence of the event studied.

Some subanalyses presented small samples and were subjected to the Fisher test.

p values <0.05 were accepted as type I errors. SPSS 20.0 for Windows was the software used for the analyses.

Results

The study population was composed of 33 patients and 50 fingers were analyzed.

Male sex predominated (94% in the PF group and 88% in the PCF group) and the ulnar fingers were affected more often.

The PCF technique was used to treat 26 fingers, and 15 of them presented contracture of the PIP joint (+).

IN the PF group, there were 24 fingers, of which 21 were PIP (+).

The only significant difference between the two groups was that the right side was predominantly affected in the PF group and the left side in the PCF group (Table 2).
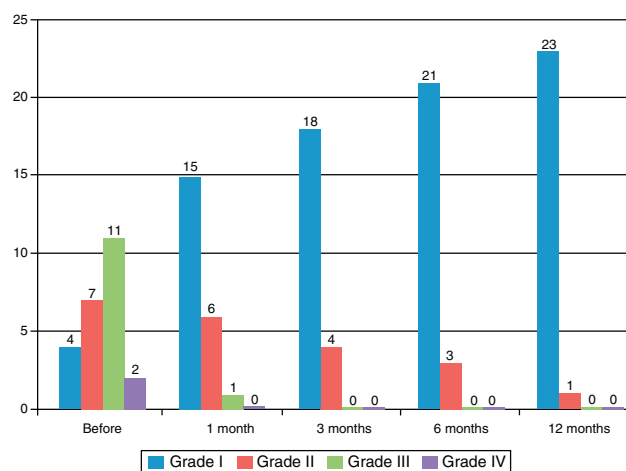
Regarding the distribution according to the Tubiana classification, the patients in the PF group presented significant improvements in contracture.

Over the 12 months of the evaluation, it was noted that grades IV, III and II converged to grade I (23 fingers of grade I and only one of grade II [Fig. 9]).

In the PCF group, there was a more significant improvement in contracture of the fingers, and 88% of the fingers reached grade I (23) in the first postoperative month.

After six months, 96% of the fingers had reached grade I (25), with subsequent worsening to 85% (22 fingers) after 12 months.

No fingers of grades III and IV were observed after 12 months (Fig. 10).

Figure 9 – Distribution of the number of fingers in the PF group, according to the Tubiana classification before the operation and one, three, six and twelve months after the operation.
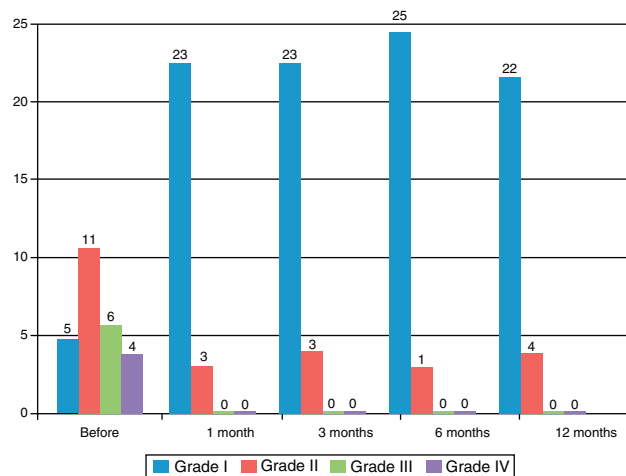
Figure 10 – Distribution of the number of fingers in the PCF group, according to the Tubiana classification before the operation and one, three, six and twelve months after the operation.

Table 3 – Number of patients with contracture of the PIP over the course of the study in the PF and PCF groups.

	Before operation	1 month	3 months	6 months	12 months
PF	21	16	13	13	10
PCF	15	10	11	9	10
p value	0.529	0.709	0721	1	0.320

Source: Hospital Nossa Senhora do Pari.

In relation to the number of patients who presented contracture of the PIP joint (+), there was no significant difference between the PF and PCF groups.

Complete correction of the PIP contracture was achieved in 23.8% of the PF group and in 33.3% of the PCF group in the first month after the operation.

After one year, 52.4% of the (+) patients in the PF group were free from contractures in the PIP joints, while the number remained unaltered in the PCF group (Table 3).

In relation to DASH, the PF group presented a mean score of 21.92, with a range of 20.3.

The PCF group presented a mean of 29.12 with a range of 20.65, without any significant difference between the two group ($p = 0.102$).

IN relation to the time taken to return to professional activities, the PF group returned after a mean time of 32.92 days (± 19.8) and the PCF group after 38.35 dias (± 31.3). This difference was not statistically significant ($p = 0.484$).

After 12 months, there was a significant improvement in TPED in both groups, with evolution from 91.96° to 10.23° in the PF group and from 87.77° to 23.46° in the PCF group. The result was statistically superior in the PF group (Table 4 and Fig. 11). There was greater recurrence of contractures in the PCR group (four groups in three patients).

In the PF group, there were two fingers in one patient, without a statistically significant difference ($p > 0.05$).

Among the fingers with recurrence, only three belonging to the PCF group presented PIP contracture before the procedure.

There was no statistical correlation between recurrence and the presence of PIP contracture.

There was no correlation between TPED and the DASH score ($p > 0.05$).

In this study, no complications were considered to be severe (i.e. injuries to nerves, tendons or vessels that would require subsequent interventions).

In the PF group, there was one case of partial necrosis of the borders of the operative incision.

In the PCF group, there was one case of type I complex regional pain syndrome and one case of transitory paresthesia of the fingers. These cases were resolved satisfactorily with conservative treatment.
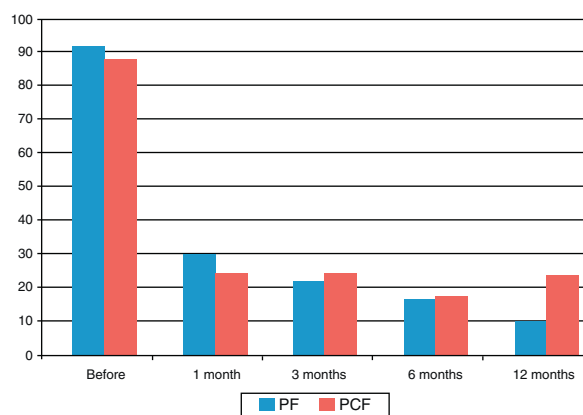
Figure 11 – Total passive extension deficit (TPED) in degrees, in the PF and PCF groups before the operation and one, three, six and twelve months after the operation.

Discussion

Surgical treatment of Dupuytren's contracture still lacks precise indications according to the grade of the clinical presentation and each patient's individual needs.

Comparative studies and studies with a high level of evidence are scarce in the literature.[15]

The case series that have been described only analyzed one type of technique[12–14,17] and there has not been any standardization for the evaluations. These factors make it difficult to choose the best treatment option.

The epidemiological data contained in the sample of this study were homogenous in the two groups evaluated and were equivalent to the data in the literature.[18–21]

The only difference between the groups was in relation to the involvement of the left hand, which was significantly greater in the PF group, while the involvement of the right hand was significantly greater in the PCF group.

The PF technique has been described in the literature as effective in relation to initial correction of contractures.[2,15,22,23] One week after performing PF, van

Table 4 – Total passive extension deficit (TPED) in degrees, in the PF and PCF groups before the operation and one, three, six and twelve months after the operation.

	Before ($\pm$SD)	1 m ($\pm$SD)	3 m ($\pm$SD)	6 m ($\pm$SD)	12 m ($\pm$SD)
PF	91.96 ± 42.3	30.32 ± 26.6	21.91 ± 19.9	16.59 ± 18	10.23 ± 14.2
PCF	87.77 ± 44.2	24.23 ± 21.5	24.04 ± 19.8	17.5 ± 16.4	23.46 ± 19.3
p value	0.734	0.386	0.713	0.833	0.038

Source: Hospital Nossa Senhora do Pari.

Rijssen et al.[23] obtained a correction of TPED of 73%, and they reached 15°.

Studies have shown that PCF also achieves a good degree of correction initially.[10,14,17,22] In a review on 1000 cases of PCF, Pess et al.[17] found that almost total correction was achieved in the immediate postoperative period, with 99% correction for the MCP joint and 89% for the PIP.

In a randomized comparative study, van Rijssen reported PF achieved a significantly greater degree of correction in the immediate postoperative period (73% versus 58% for PCF). In our comparative study, the techniques were equally effective.

In relation to TPED, both techniques produced a significant progressive improvement over the months. However, after completion of 12 months of follow-up, the results were significantly better with the PF technique.

Progressive improvement after the procedure was also observed by van Rijssen et al.[23]

The higher TPED value for PCF than for PF after 12 months, as found in the present study, is also in agreement with what has been described in the literature, in which the percutaneous technique has presented greater contracture values with longer follow-ups.[15]

There is no consensus in the literature regarding what characterizes recurrence of the disease.[24]

Some authors have considered this to be the return of palpable cords at a site that had previously been treated, while others have ascribed this to degrees of worsening of TPED.[17,23]

The presence of a palpable cord is not a good criterion for determining recurrence in cases of PCF, since the cords are not excised and may be palpable even after the procedure.[15]

In the present study, the definition used was a worsening of TPED by 20° or more in relation to what was obtained one month after the operation. This was similar to the criterion used by Pess et al.[17]

In a study over a five-year period, van Rijssen et al.[15] used a similar criterion, but with a value of 30°.

We chose the value of 20° because this was more sensitive and more appropriate for a study with a follow-up of only one year.

According to this criterion, a recurrence rate of 8.3% was observed for the PF group and 15.4% for PCF, after 12 months. This difference was not significant ($p > 0.05$).

According to van Rijssen et al.,[15] recurrence was seen earlier and more incisively in the PCF group (30.19% in the first year), but no recurrence was seen in the PF group in the first year. In the same study, after five years, the recurrence rate in the PCF group was 84.9% versus 20.9% in the PF group.[15]

Although we used recurrence criteria that were more rigorous than those of the abovementioned study, our recurrence rate in the PCF group was considerably lower after one year: 15.4% versus 30.19% over the first year of the study by van Rijssen et al.[15]

Badois et al.[15] found a five-year recurrence rate of 50.4%, which was also considerably lower than the 84.9% obtained by van Rijssen, albeit with corticosteroid use.

In a systematic review, Chen et al.[22] found recurrence of 50–58% for PCF over a three- to five-year period. In the same review, the recurrence rate for PF was 12–39% over a period of 1.5–7.3 years.

Some authors have also described repetition of the PCF technique after recurrence and have obtained good results.[25]

When contracture of the PIP joint was present, there was no significant difference in the correction obtained using the two techniques. These data demonstrate that despite the impossibility of performing capsulotomy in the percutaneous technique, it was possible to achieve correction of the contracture of the PIP joint in a good proportion of the cases.

We did not observe the return of contracture in this joint with either of the techniques, over the period evaluated.

The study by Pesset et al.,[17] with a sample of 1000 cases of PCF, also demonstrated a good correction rate for contracture of the PIP joint (89%), but with a high recurrence rate in this joint (65% versus only 20% in the MCP).

In the study by van Rijssen, the correction obtained for the PIP was not so efficient, with a mean correction of only 40%, one month after the operation, and the recurrence rate for the PIP was also high (74%).[15]

The usefulness of the DASH protocol for Dupuytren's contracture has been contested by some authors[26] and validated by others.[27]

In the present study, no direct statistical correlation between DASH and TPED was observed ($p = 0.045$).

The DASH score was lower in the PCF group after six months (29.12 versus 21.92 for PF), but without statistical significance.

In a short study lasting six weeks, van Rijssen et al.[23] found significantly higher DASH results for PCF.[23] This difference can be attributed to earlier application of the DASH protocol (six weeks versus six months), given that PCF has an advantage over this period because it is a less invasive procedure.

In this study, it was decided to perform the DASH protocol only after six months, because it is difficult to apply and its use in all evaluations would be unviable in the hospital service in question.

Thus, it was considered to be sufficient for determining the functional result, since the rehabilitation had already been concluded in all cases.

Different lengths of time off work have been shown in the literature for the PF and PCF techniques.[5,23,28]

Although there was no statistically significant difference, there was a greater mean length of time off work in the PCF group (38.35 days versus 32.92 for PF).

A faster return to professional activities would be expected among patients undergoing PCF because this is a less invasive procedure with faster healing.[29] The short time and low sampling may have influenced this.

No tendon or neurovascular injuries were found in using either of the techniques. The most serious complication occurred in the PCF group, consisting of a case of type I complex regional pain syndrome.

The PF group presented only one case of necrosis of the incision borders, and this did not require a new surgical procedure.

Skin tears after percutaneous release were common. However, because of their rapid resolution, they were not considered to be complications.

The results demonstrated that both procedures were safe and had low complication rates, which is concordant with the current literature.[17,23,30]

Although not evaluated in this study, it is important to emphasize that PCF is a considerably less expensive and notably faster procedure, and has the advantage that it can be done in an outpatient setting, under local anesthesia.

Over the 12-month period, we observed that both techniques presented a good degree of correction of the deformity, with few complications.

Both techniques are adequate treatments for Dupuytren's contracture, although PF presented better TPED at the end of the evaluation period.

Depending on each patient's needs and preferences, and those of the surgeon, a particular technique can be indicated.

For patients who require a less invasive technique and do not demand a more long-lasting technique, PCF is a procedure with lower cost that is faster and easy to perform. On the other hand, for patients who require a longer time free from contractures and who do not wish to undergo multiple procedures, PF is a better indication.

Longer-term studies with larger samples are needed in order to determine the incidence and recurrence time more precisely, and to determine the need for new procedures. In this manner, it will be possible to better define the indications for each technique.

Conclusion

The PF and PCF techniques are effective for treating Dupuytren's contracture.

Twelve months after the operation, the total passive extension deficit in the group treated with PF was significantly lower, and there were no significant differences between the techniques regarding the functional results, time taken to return to professional activities and recurrence of the pathological condition, in relation to the parameters of this study.

Conflicts of interest

The authors declare no conflicts of interest.

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