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NEEDLE APONEUROTOMY FOR DUPUYTREN'S CONTRACTURE.

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ABSTRACT… Needle Aponeurotomy is a negligibly obtrusive method where the cords are debilitated through the manipulation & insertion of a small needle. To determine the frequency of recurrence of flexion contracture after correction by percutaneous needle Aponeurotomy. **Study Design:** Prospective longitudinal study. **Setting:** Department of Orthopedics, Jinnah Postgraduate Medical Centre, Karachi. **Period:** March 2017 to February 2018. **Materials and Methods:** 65 patients were collected for this study with dupuytren's contracture from stage I-III belonging to either sex of age 18-50 years presented in outpatient department. **Results:** Total 65 patients were included in the study. Mean flexion contracture was 35.84^0 with the standard deviation of 13.07^0. Most of the patients 44(67.7%) had flexion contracture of $>30^0$ while 21(32.3%) patients had flexion contracture of $\leq 30^0$. Majority of the patients had stage 1 of Dupuytren's contracture, i.e. 26(40%), 25(38.5%) patients were of stage 2 contracture. Least number of patients i.e. 14 (21.5%) had stage 3 Dupuytren's contracture. Recurrence of contracture was observed in 46(70.8%) of patients, while 19(29.2%) patients had no recurrence of contracture. **Conclusion:** The frequency of recurrence of flexion contracture found significant after correction with percutaneous needle aponeurotomy, so should be carried in selective patients with counseling's that it will recur. But acute correction can be made at metacarpophalangeal and proximal interphalangeal joint with needle aponeurectomy.

Key words: Duputren's Contracture, Needle Aponeurectomy, Recurrence

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INTRODUCTION

The Baron Guillaume Dupuytren, surgeon at Paris in 1831 described a dupuytrens contracture.[1] In dupuytren's contracture, fingers get bend due to abnormal thickening of palmar fascia and impair the normal cascade of fingers and hand function. The small and ring fingers are commonly affected.[2] The dupuytren's contracture decreases patient's ability to grip the objects.[3] Dupuytren's disease often starts with nodules in the palm of the hand and it can extend to a cord in the fingers.[4] Type I collagen is replaced by type III that is thicker.[5] The contracture sets in slowly and treatment is indicated when the so called table top test is positive.[6] The fibroblast in the fascia structurally changes to the myofibroblast described by Majno.[7] In Europe 82% families of both gender with male to female ratio 82: 16 reported.[8] The incidence among human immunodeficiency virus (HIV) patients exceeds that of the general population.[9] Dupuytren's disease also a genetic disease and is autosomal-dominant.[10] The expression of the gene is less complete in females, which accounts for the lower incidence and later onset among the female population.[11] The Dupuytren's disease is progressive and common in fifth decade in males and the sixth decade in females. Dupuytren's contracture is associated garrod pads, ledderhoose and Peyronie's diease.[12]

MATERIAL AND METHODS

Study Design

It was a prospective longitudinal study conducted at the department of Orthopedics, Jinnah postgraduate medical centre, Karachi from March 2017 to February 2018.

Sample Size
Non probability consecutive sampling technique used. Proportion of effectiveness taken as 35%.[7] Confidence level 95%, Bound on error 12%andSample size (n) calculated as 65 patients.

Inclusion Criteria
Dupuytren's contracture stage I-III (according to Tubiana classification system[13]- Table-I) belonging to either sex of age 18-50 years.

Exclusion Criteria
Recurrent disease, hand infection of affected hand, known hypersensitivity with lignocaine and stage IV disease.

Data Collection Procedure
This study was concluded after obtaining the approval from the hospital ethical committee of Jinnah postgraduate medical center, Karachi. Those patients fulfilling the inclusion criteria and admitted through OPD was registered after taking informed consent from the patients by researcher. All the data of patient was collected and recorded in the proforma. Operation was performed by a senior consultant with at least 5 years post-fellowship experience. Post operatively patient was discharged on same day on analgesic medication to be taken when required.

OPD follow ups was carried out at 2^{nd},7^{th},14^{th} days and 4^{th},6^{th},8^{th},10^{th}, and 12^{th} week for assessment of correction of flexion contracture between metacarpals and phalanges. Reappearance of flexion deformity of more than or equal to 10^0 post procedure at the end of 12^{th} weeks was deemed as recurrence.

Data Analysis Procedure
The data was analyzed through SPSS version 13.0. frequency of recurrence was presented by their counts along with percentage. Mean ± standard deviation was calculated for age and flexion contracture. Stratification was done for age, gender, duration and stage of contracture to see the effect of these on outcomes, chi square test was applied and P≤ 0.05 was taken as significant.

RESULTS
65 patients were collected for this study with dupuytren's contracture from stage I-III belonging to either sex of age 18-50 years presented in outpatient department.

Mean age of the patient was 40.01 years with the standard deviation of 7.93 years. (Table-II) The minimum age was 26 while maximum age was 50 years. Age distribution shows that most of the patients 44(67.7%) were of age >35 years, while 21(32.3%) patients were of ≤35 years age.

Gender distribution indicates that male patients were dominant 58(89.2%) as compared to female patients 7(10.8%). Mean duration of contracture was 4.96 years with the standard deviation of 2.31 years. The minimum duration was 2 years while, maximum duration of contracture was 11 years. Mean flexion contracture was 35.84^0 with the standard deviation of 13.07^0. There were 40(61.5%) patients with >5 years duration of contracture and 25 (38.5%) patients had duration of contracture of ≤5 years. Most of the patients 44(67.7%) had flexion contracture of $>30^0$ while 21(32.3%) patients had flexion contracture of $\leq 30^0$. (Table-III)

Majority of the patients had stage 1 of Dupuytren's contracture, i.e. 26(40%), 25(38.5%) patients were of stage 2 contracture. Least number of patients i.e. 14 (21.5%) had stage 3 Dupuytren's contracture. (Figure-1) Recurrence of contracture was observed in 46(70.8%) of patients, while 19(29.2%) patients had no recurrence of contracture. (Figure-2)

Out of 21 patients of age ≤35 years, recurrence of contracture was noticed in 16(76.2%) while in patients of >35 years recurrence of contracture was noticed in 30(68.2%) patients. (Figure-2) Chi-square test was applied and it reveals that no significant effect of age group found on recurrence of contracture (p-value 0.507).

Out of 58 male patients recurrence of contracture was noticed in 42(72.4%) patients while 4(57.1%) women had recurrence of contracture was noticed in female patients. Chi-square test was

applied and it reveals that no significant effect of gender found on recurrence of contracture (p-value 0.331).

There were 18(72%) patients with recurrence of contracture who had duration ≤5 years and 28(70%) patients with duration of contracture >5 years had recurrence of contracture. Chi-square test was applied and no difference was observed as p-value 0.86.

There were 22(84.6%) patients with stage 1 Dupuytren's contracture had recurrence. In patients with stage 2 Dupuytren's contracture, recurrence occurred in 17(68%) patients, while 7(50%) patients of stage 3 Dupuytren's contracture had recurrence. Chi-square test was applied and no difference was observed as p-value was 0.06.

Age of the patients (in days)	Mean	Standard Deviation	Minimum	Maximum
	40.01	±7.93	26	50

Table-I. Age of the patients n=65

Flexion Contracture (In years)	Mean	Standard Deviation	Minimum	Maximum
	35.84^0	$\pm 13.07^0$	13^0	54^0

Table-II. Flexion contracture n=65

Stage I	0-45 degree
Stage II	45-90 degree
Stage III	90 to 135 degree
Stage IV	>135 degree

Table-III. Tubiana classification system

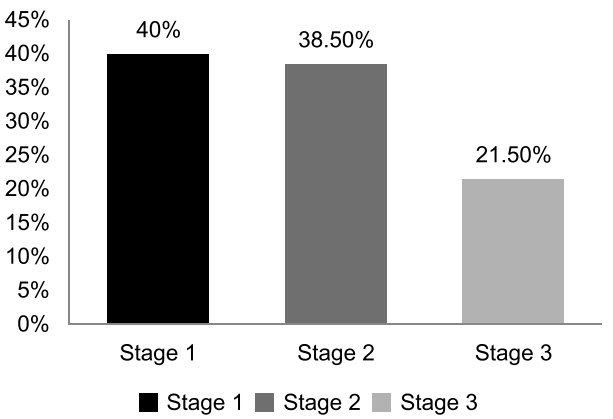

Figure-1. Stages of contracture

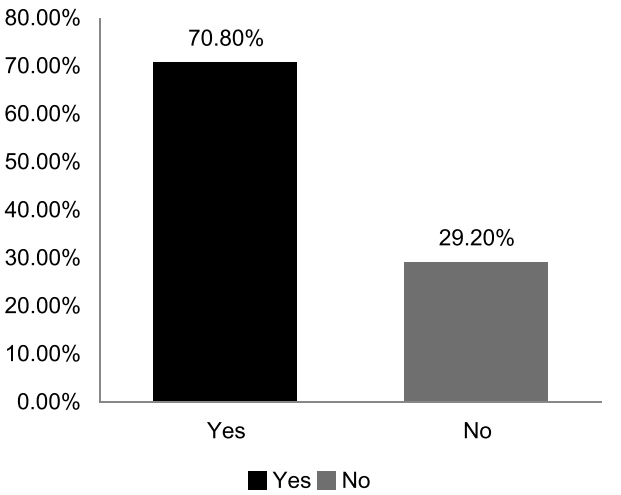

Figure-2. Recurrence of contracture

DISCUSSION

Pess et al; showed immediate postoperative correction in 98 % (791) of MP joints and 67 % (350) PIP joints with needle aponeurotomy provided in 5° or less contracture. There was recurrence of 20° or less over the original postprocedure corrected level in 80% (646) of MP joints and 35% (183) of PIP joints.[14]

There was immediate correction of MP joint contractures from an average of 35° preoperatively (range, 15° to 95°; SD 19) to an average of 1° post procedure (range, 0° to 80°; SD 4). At final follow-up, there was a residual contracture of 11° (range, 0° to 80°; SD 18).[14]

Our results were fairly matched with a study in which immediately after release, the mean flexion contracture correction of the metacarpophalangeal joints (MCPJs) was 50º and at the 22-month follow-up, the mean residual flexion contracture of the MCPJs was 12º.

Needle Aponeurotomy can be used to treat post-operative re-occurrences of Dupuytren's contracture, with the exception of retractile scars and capsular retractions of the PIP joint.[15]

The immediate results are excellent in 89-92% with Tubiana stage 1 and 2, good with stage 3 (83%) and intermediate with stage 4 (48%) disease, with no aggravation or failure, unlike in surgical series.

After five years, results are sustained in stage 1, 2 and 3 (92, 74 and 57%, respectively), but in only 38% in stage 4. The recurrence rate reaches 50% in all series.[16]

Herrera et al, treated 525 digits in 193 hands with needle aponeurectomy. 140 patients were male, average age was 65 years. The average preoperative total Passive Extension Deficit (TPED) was 41° and the average immediate postoperative TPED was 1° (98% correction) (P=0.0001). The average TPED at 4.5 month follow up was 11° (73% correction). Infection occurs in 3 patients and one case each of triggering, delayed flexor tendon rupture, complex regional pain syndrome and persistent numbness. Recurrence was observed in 62 digits.[17]

Cheng et al; 41 points were released in 13 fingers (3middle, 3ring, and 7 little). Immediately after release, the respective mean flexion contracture correction of the metacarpophalangeal and proximal interphalangeal joints was 50 (from 50 to 0) and 35 (from 46 to 11) degrees. At 22-month follow-up, the respective mean residual flexion contracture of both joints were 12 and 27 degrees; the corresponding long-term improvements were 70 and 41%. No patient had a wound complication or neurovascular injury.[18]

Yoo et al, treated 32 fingers with ultrasound guided percutaneous needle fasciotomy four weeks after steroid injection that showed clinical improvement with 100% satisfaction. Clinical success rates of ring and little fingers were 64.29% and 44.44%, respectively (p=0.18). Superior clinical success was noted in the metacarpophalangeal joint compared to proximal interphalangeal joint (79.31% vs. 23.08%, p<0.001). The mean percentages of improvement in the contracture angle were 92.48% for MCPJ and 65.58% for PIPJ. No complication was noted.[19]

Raisanen et al, expect to find higher rate of progression of disease and, thus, higher rates of secondary interventions after percutaneous treatments.[20]

Study at Philadealphia showed there was immediate correction of MP joint contractures from an average of 35° preoperatively (range, 15° to 95°; SD 19) to an average of 1° post procedure (range, 0° to 80°; SD 4). At final follow-up, there was a residual contracture of 11° (range, 0° to 80°; SD 18). Metacarpophalangeal joint contractures were corrected an average of 99% immediately postprocedure and maintained an average correction of 72% at long-term follow-up.

For PIP joints, needle aponeurectomy immediately reduced the contracture from 50° preoperatively (range, 15° to 110°; SD22) to 6° post procedure (range, 0° to 87°; SD 11). At the time of final follow-up, the contracture had recurred to an average of 35° (range, 0° to 95°; SD 25). Proximalinterphalangeal joint contractures were corrected an average of 89% immediately post procedure and maintained an average correction of 31% at final follow-up. The difference between the final corrections for MP versus PIP joints was statistically significant (*P* _.001).[21]

In 2017 Zhou et al; conducted multicenter study on 130 matched patients (93% Tubiana I or II) undergoing PNA (n = 46) and CCH (n = 84), improvement in contracture was similar: 26 degrees (65% improvement from baseline) for PNA versus 31 degrees (71%) for CCH for affected metacarpophalangeal joints (*P* = 0.163). This was 16 degrees (50% improvement) versus 17 degrees (42%) for affected proximal interphalangeal joints (*P* = 0.395), respectively.[22]

Randomized control trials in two centers showed, Forty out of 46 needle fasciotomies and 36 out of 40 collagenase injections were assessed for recurrence. Forty-three percent of the needle fasciotomies and 34% of the collagenase injections had recurrent disease (P ¼ 0.65). Eleven (24%) of the patients with needle fasciotomies and four (10%) of the ones with collagenase injections had been retreated prior to three years (P ¼ 0.09).[23]

A retrospective chart review was conducted in which the charts of 53 patients who underwent needle aponeurotomy for Dupuytren contracture that concludes night extension splinting following needle aponeurotomy may not improve acute

range of motion of metacarpophalangeal joint or proximal interphalangeal joint.[24]

CONCLUSION

The frequency of recurrence of flexion contracture found significant after correction with percutaneous needle aponeurotomy, so should be carried in selective patients with counselling that it will recur. But acute correction can be made at metacarpophalangeal and proximal interphalangeal joint with needle aponeurectomy.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Muhammad Arif	Conception and design, Statistical expertise.	
2	Saeed Ahmed Shaikh	Collection and assembly of data.	
3	Badaruddin Sahito	Analysis and interpretation of data.	
4	Nadeem Ahmed	Drafting of the article.	
5	Muhamamd Qasim	Critical revision of the article for intellectual content.	
6	Allah Rakhio Jamali	Final approval and guarantor of the article.	