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Needle percutaneous fasciotomy (needle aponeurotomy) for Dupuytrens contractures

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ABSTRACT

Background: Dupuytrens disease is characterized as a fibromatosis of the palmar fascia. The disease process starts as a nodule at the distal palmar crease that progressively gives rise to a cord invading distally towards the finger that results the contractures at the metacarpophalangeal (MCP) or proximal interphalangeal (PIP) joints. The purpose of study was to evaluate the efficacy and safety of needle percutaneous fasciotomy (PCF) in Dupuytrens contracture.

Method: This was the prospective clinical study of the results of needle percutaneous fasciotomy in the treatment of Dupuytrens disease. Patients with metacarpophalangeal (MCP) or proximal interphalangeal (PIP) joint contracture of 20° or greater were included for the NA. Preoperatively MCP and PIP joint contractures were measured and were 55°(30°-90°) and 40°(20°-90°) respectively. Post procedure results were analyzed by measuring an average correction of contracture.

Results: Total of 15 patients with over 20 fingers was included and was followed up over the period of 9 months. 12 were males and 3 females, with an average age of 65years. Metacarpophalangeal joint contractures were corrected an average of 98% immediately post procedure and maintained an average correction of 82 % at final follow-up. Proximal interphalangeal joint contractures were corrected an average of 87% immediately post procedure and maintained an average correction of 50% at final follow-up. There was the significant difference (p valve < 0.05) in the maintenance of correction between MCP and PIP joint at final follow up.

Conclusion: Needle Percutaneous fasciotomy (PCF) is an appealing procedure that can be performed in an outpatient setting. The procedure is safe and less invasive, inexpensive, is more effective at MCP joint contractures and have low complication rate.

Level of evidence: Type IV

Keywords: Dupuytrens; Contracture; Needle; Percutaneous; Fasciotomy

INTRODUCTION

Dupuytren disease is a proliferative fibroplasia of the subcutaneous palmar tissue occurring in the form of nodules and cords[1]. Commonly occurring in adults in their forties to sixties and is ten times more frequent in men than in women[2]. It is commonly seen in white northern European individuals, although it has been reported occasionally in blacks and rarely in Asians[2]. The lesion has been reported to be more frequent and severe in individuals with diabetes mellitus or with epilepsy and alcoholism[3]. The lesion usually begins on the ulnar side of the hand at the distal palmar crease and progresses to involve the ring and little fingers than other fingers. The lesion is usually painless and the flexion contractures gradually develop at metacarpophalangeal and proximal interphalangeal joints. Various treatment modalities are available including non-operative options like External beam radiation, Steroid and collagenase injections and operative treatment includes percutaneous fasciotomy (Scalpel or Needle), limited or partial (selective) fasciectomy, Complete fasciectomy, Fasciectomy with skin grafting, Staged external fixation and arthrodesis[4].

Materials and Methods: This was the prospective clinical study conducted in the department of Orthopaedics at Shri Mahant Indresh hospital Patel nagar dehradun Utrakhand. Approval from hospital ethics committee was taken. Patient with a palpable

cord and symptomatic contracture due to Dupuytrens disease at metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints were included for the study. Patients with severe contractures and with recurrent contracture due to prior surgeries were excluded. All flexion contractures were documented at each joint, presence of cords and nodules were traced, severity of skin involvement, skin dimpling and neurovascular integrity was noted. Photographs were taken before and after the procedure.

Technique: The procedure was carried out in an outpatient procedure room. The hand was prepared with10% povidone antiseptic solution and was draped. No tourniquet was used. All patients were positioned lying in the supine position, with the hand resting on an arm board. All cords were palpated and were marked at different sites in order to precisely plan out needle entrance points or portals. Skin flexion creases were avoided, as these may be prone to skin tears and potential flexor tendon laceration. As many portals as possible were marked, with the goal of maintaining at least 5 mm distance between each mark.

Image 1: Shows marked portal sites over the palpable cord

The marked portal sites were infiltrated with 2% lignocaine of about 1-2ml. 25-guaze needle was used for the procedure. The involved finger was firmly extended during the procedure so that the cord is tensioned. The needle was introduced in to the marked site usually at the centre of cord and was passed through the cord. Needle was removed once the obvious loss of resistance was felt when the needle passed dorsally out of the cord. Using the same puncture site in the skin, needle was angled and swept in a different direction. Cord was continuously swept and perforated in different directions in a fan-shaped pattern in a transverse plane until the cord ruptures. This rupture was either felt or heard as the joint starts to straighten. Needle was removed and other portal was used to rupture the cord. During the whole procedure neurovascular integrity and patients feedback regarding tingling sensation over the fingers was continuously monitored. Sterile dressing was kept over the puncture site once the maximum possible correction was achieved and the involved finger was kept in hyperextended position of about 10°. Patients are instructed to elevate their hands and apply cold packs for the first 24 to 48 hours.

Results: 15 patients were included for the study and were followed up over the period of 9months.Average age was 65years (range 48-70). 12 were males and 03 were females. Right hand was involved in 9 and left hand in 6 patients. Ring finger was involved in 05 patients, little finger in 03 patients, middle finger in 01 patient, both little and ring finger in 06 patients. 08 patients were diabetic while 05 patients were alcoholic/smokers.

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Image 2: a b c

a. shows PIP joint contracture of 70° preoperatively, b and c shows full PIP contractor correction in post procedure follow up

There was immediate correction of MP joint contractures from an average of 55° preoperatively (range, 20° to 90°) to an average of 1° intraopertively (range0-10°). At final follow-up, there was a residual contracture of 15° (range, 0° to 40°). Metacarpophalangeal joint contractures were corrected an average of 98% immediately post procedure and maintained an average correction of 82 % at final follow-up as shown in table 1.

For PIP joints, NA immediately reduced the contracture from 40° preoperatively (range, 20° to 90°) to 5° intraopertively (range, 0° to 20°). At the time of final follow-up, the contracture had recurred to an average of 20° (range, 0° to 50°). Proximal interphalangeal joint contractures were corrected an average of 87% immediately post procedure and maintained an average correction of 50% at final follow-up as shown in table 1.

	Preoperative deformity (degrees)	Intraopertive Average deformity correction (degrees)	Postoperative Average deformity correction (degrees) at 9 months
MCP joint contracture	55° (30°-90°)	1° (0-10°)	10° (0-40°)
PIP joint contracture	40° (20°-90°)	5° (0-20°)	20° (0-50°)

Table 1: MCP- Metacarpophalangeal, PIP- Proximal interphalangeal

Discussion: Conventional surgeries for Dupuytrens contracture carry a higher risk of complications[5], with recurrence rates of 34 to 66% after limited local excision[6,7] and 11.6% after extensive excision of the entire palmar aponeurosis[8]. Percutaneous needle fasciotomy (PNF) is a safe, simple, and inexpensive method for treating mild to moderate Dupuytren contractures with a palpable cord and an extension deficit in the metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints[9,10,11]. It releases the contracted cords by cutting the fibers with a needle inserted percutaneously. It represents a good treatment option for patients, whose health precludes general anesthesia, and elderly patients or patients with a limited life expectancy. The technique allows better and longer-lasting results at the MCP joint than at the PIP joint[10,11].

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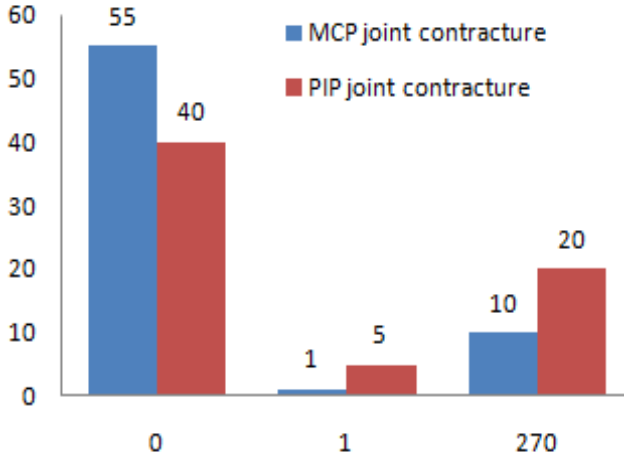

Finger1: Significant difference in the maintenance of average correction at MCP and PIP joints

Several studies are present in literature regarding the efficacy of NA in the treatment of Dupuytrens contracture, showing good short and long term results with minimal complication rates. Badois et al[12] published, the results of NA. There were no major complications, although there was a skin break in 16%, digital dysesthesia in 2%, and infection in 2% cases. Bleton et al[13] documented the results of a prospective study of NA. All complications were minor, including skin tear in 4%, temporary paresthesia in 2%, and superficial infection in 1%.Lermusiaux et al[14] related the results of a large number of NA procedures. An improvement of over 70% was observed in 81% of hands. The complication rate was 0.05% for both tendon and digital nerve injuries. Foucher et al[15] reported a 79% gain in extension for the MP joint and 65% for the PIP joint. There was 1 digital nerve injury

Gary M et al[10] reported the results of over 1000 fingers using NA and achieved the MP joint contracture correction in 99% and PIP contractures an average of 89% immediately post procedure. At final follow-up, 72% of the correction was maintained for MP joints and 31% for PIP joints. There was recurrence of 20° or less over the original post procedure corrected level in 80% of MP joints and 35% of PIP joints. Complications were rare except for skin tears, which occurred in 3.4% (34) of digits.

In our study of 15 patients with 21 fingers underwent PCF, there was immediate average correction of deformity in 87-98% and the average correction was maintained in 50 -82% cases at final follow up. MCP joint contracture has significantly better outcome after PCF than PIP joint contractures. Complications like skin break down and paresthesias were observed in two patients. Recurrence of contracture at PIP joint was more frequent than MCP joint.

Conflict of interest: none

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