



OUR EXPERIENCE WITH DUPUYTREN'S CONTRACTURE AND PATIENTS PERSPECTIVES USING THE MICHIGAN HAND QUESTIONNAIRE

Plastic Surgery

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ABSTRACT

Background: Dupuytren's disease is a benign proliferative disease of the palmar and digital fascia. Patients with severe contracture and functional disability are operative candidates. Most common treatment modalities employed are regional fasciectomy or dermato fasciectomy. As this disease is relatively uncommon in India, our purpose is to study the disease severity, its underlying associations, and the outcomes after surgery. **Methods:** A study was done on 46 patients over the last 17 years who presented to our institute. All patients underwent regional fasciectomy or dermato fasciectomy for the deformity and were followed up for a period of 2 years. Michigan Hand Questionnaire scores were calculated for each patient in pre-operative and 6 months post-operative period. **Results:** Out of the 46 patients operated, 52.17% patients had bilateral hand involvement, 36.95% patients had involvement of right hand exclusively while only 10.86% patients had involvement of left hand alone. 41.3% of the patients whose right hand was operated on belonged to Tubiana Stage 3. Regional fasciectomy with/without grafting was done in 52.17% patients whereas dermato fasciectomy with grafting was done in remaining 47.82% patients. Recurrence was seen in 6.52% of the patients. The Michigan Hand Questionnaire calculated at 6 months showed 20-40% improvement in all stages of Tubiana and maximum improvement was seen with Aesthetics scale. **Conclusion:** The operative outcome, complications and recurrence rates are comparable to other published studies. Regional fasciectomy has proved to be safe and effective in all stages of Tubiana classification.

KEYWORDS

Dupuytren's disease, Tubiana, Regional fasciectomy, Dermato fasciectomy, Michigan Hand Questionnaire

INTRODUCTION

Dupuytren's Contracture is a disabling condition leading to fibroproliferative disease of the palmar and digital fascia. The disease was first discovered by Felix Plotter in 1614.¹ and the surgical procedure was introduced by Dr. Henry Cline.² However, the disease is attributed to the French surgeon, Baron Dupuytren who worked on Cline's observations in 1831.^{1,2} Dupuytren's Contracture has been suggested to be a 'Viking' disease spread from Scandinavia (Denmark, Sweden, Norway, Finland, Iceland, Faroe Islands, Greenland, and Åland Islands) to whole of Europe during 9th to the 13th century.³ Highest prevalence of the disease is thus seen in Northern Europe (2%-42%)^{2,4} followed by others like Scotland, Ireland, Canada, New Zealand, Australia and USA to where the population migrated.³ Dupuytren's disease is relatively uncommon in the Indian subcontinent.⁵ Thus, the migration theories claim the disease to be an autosomal dominant disease with variable penetrance, but it cannot explain the disease prevalence in Asia which could be either a spontaneous mutation or Caucasian genetic mixing.³ While the exact cause for the disease remains unknown, it has certain associations like smoking, alcohol, diabetes, epilepsy, trauma. Our primary goal is to evaluate the feasibility and reliability of various treatment options for Dupuytren's Contracture among low socio-economic patients at a government hospital in India. We also aim to assess treatment outcomes and patient satisfaction using the Michigan Hand Questionnaire (MHQ). Given the limited number of studies involving a substantial number of Dupuytren's Contracture surgeries in India, this research aims to provide valuable insights into treatment outcomes within the Indian population. The findings could also inform future management strategies for Dupuytren's Contracture.

Patients And Methods:

We studied 46 patients presenting to our tertiary care hospital in central India over a period of 17 years from 2005 to 2021. All patients were

staged according to the Tubiana grading system^{6,7} (Table 1) along with their possible causative association noted.

Table 1- Tubiana Staging System

Stage	Deformity
0	No lesion
N	Palmar nodule without contracture
1	TFD between 0° and 45°
2	TFD ¹ between 45° and 90°
3	TFD between 90° and 135°
4	TFD > 135°

¹TFD- Total Flexion Deformity of MCP, PIP and DIP joints measured with a goniometer from the dorsum of hand.

All patients with MCP (Metacarpophalangeal) joint contracture > 30° and any form of contracture of PIP (Proximal Interphalangeal) joint were considered candidates for surgery. As all the patients presenting to our hospital fulfilled the above criteria, all patients were subjected to surgical procedures.

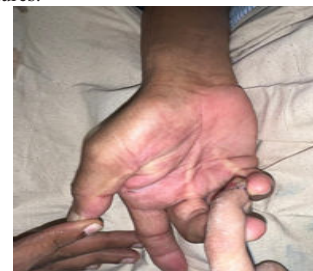


Figure 1-- Shows Dupuytren's Disease involving the right-hand middle, ring and little finger with Tubiana Stage 3

All patients were operated on by the same specialist surgeon. Figure 1 shows a pre-operative picture of patient's right hand with Dupuytren's disease.

Regional fasciectomy with or without grafting – All macroscopically diseased fascia in the palm and fingers were excised under loupe magnification sparing the neurovascular pedicle with meticulous dissection. Multiple Z-plasties were done over the skin which provided lengthening of the contracture with either primary closure or grafting of residual raw area. (Figure 2)

Dermato fasciectomy- Area of the involved skin was excised along with regional fasciectomy and the raw area covered with either STSG (Split Thickness Skin Grafting) or FTG (Full Thickness Grafting).



Figure 2A: After taking the skin incision in the form of multiple Z-plasties, the underlying pretendinous cord and spiral cord can be visualised. Regional Fasciectomy is performed. B: The contracture in right hand is relieved followed by which full range of extension is now possible in middle, ring, and little finger. C: Z-plasties over the skin are sutured. As the contracture is now released, there is a remnant raw area over the palm and ring finger. D: The remnant raw area has been covered with STSG.

Our post operative protocol involves dressing with below elbow splintage. Physiotherapy protocol depended on whether patient required grafting or not. Patients with only a suture line were started physiotherapy on post operative day 3. However, for patients with STSG and FTG, we waited till post operative day 10 to start physiotherapy, thus minimizing risk of graft loss. Splint was applied for a duration of 6 weeks and splint removed only for physiotherapy. Nighttime splint was further continued for a period of 2 weeks. Full activities and range of hand motion was allowed after 6 weeks period. Patients were admitted for a duration of 5 days post operatively till first check dress for iv antibiotics and as patients came to us from distant areas and could not travel frequently back and forth for dressings. Patients were discharged with appropriate advice for physiotherapy and to follow up at 6 months, 1 year and 2 years duration. Patients experiencing any difficulties with hand function, or any complications were advised to follow up as and when required.

RESULTS:

Our study involved a total of 46 patients including a single female patient. Plantar fibromatosis which is associated with Dupuytren's disease was seen in our female patient (Figure 3). All patients in our study belonged to the age range of 50 years to 71 years. The average duration from onset to first presentation in our hospital was 4-10 years. The majority of patients presented late with Tubiana stage 3. All patients were right hand dominant. 24 patients had bilateral hand involvement at presentation while right and left hands were involved exclusively in 17 and 5 patients respectively. 25 patients were involved with heavy machinery at work while the remaining were involved with mild to moderate work. All patients belonged to lower socio-economic strata.



Figure 3- Plantar Fibromatosis seen in our female patient.

In our study, severity of the disease was seen more in the dominant hand while only 9 patients had severity or exclusive involvement of the left hand. Table 2 shows the Tubiana Staging in the involved hands in our patients. Patients opted for surgery of the hand more severely involved rather than dominance as seen in 4 of our patients where left hand was affected more. In both hands, the most common finger involved was the ring finger followed by little finger, middle finger, thumb in that order with least involvement of the index finger. Regional fasciectomy with primary closure was done in 17 patients, with STSG done in 5 patients and FTG done in 2 patients. Dermato fasciectomy with STSG was done in 22 patients. Among these patients, one patient with bilateral hand involvement was operated for right hand 3 years back in a government hospital outside came with recurrence of the same and was subsequently operated in our institute for right hand with no recurrence at 2 years follow up. Another patient was operated for left hand in our institute 3 years back now came for his right-hand disease. He however had no complaints in left hand previously operated.

None of our patients had a family history for Dupuytren's disease, although patients had various underlying associated risk factors as shown in Table 3.

Table 2-Tubiana Staging in our Patients.

Tubiana staging	Right hand	Left hand	Bilateral hand	
			Operated Hand	
			Right hand	Left hand
Stage 1	3	-	-	-
Stage 2	5	3	4	3
Stage 3	9	2	10	1
Stage 4	-	-	6	-

Table 3-Risk factors of Dupuytren's Disease in Our Patients

Risk Factors	Out of 46 patients
Alcohol	20
Smoking /tobacco	16
Diabetes Mellitus	13
Hypertension	14
Epilepsy	0
Trauma	1
Heavy machinery use involving vibratory tools	25

Complications seen in post operative period were graft loss in 3 patients due to underlying hematoma. Hematoma was drained during first check dress and the subsequent raw area healed spontaneously within 2 weeks duration (Figure 4). Partial flap necrosis was seen in 2 of our patients again did not require any intervention. Stiffness with edema was seen in 4 patients which resolved with limb elevation and physiotherapy. Recurrence was seen in 3 patients after 2 years out of which one patient underwent revision fasciectomy of left-hand ring finger while another 2 patients who were over 70 years old did not wish to undergo a repeat surgical procedure.



Figure 4- Post operative picture at 2 weeks. The patient had graft loss over the palm which healed with regular dressings.

Table 4- Michigan Hand Questionnaire Scores in Our Patients

Scale	Before Surgery		6 months After Surgery	
	Average	Range	Average	Range
Overall Hand Function	40.10	20-60	65.03	50-90
Activities of Daily Living	35.97	8.57-64.6	65.22	43.92-89.64
Work	47.60	30-75	66.19	50-95
Pain	8.69	0-60	4.13	0-25
Aesthetics	27.85	6.25-50	62.72	31.25-93.75
Satisfaction	43.74	20.83-58.3	68.55	50-87.5

For the pain scale, higher scores indicate more pain. For the other 5 scales, higher scores indicate better hand performance.

Michigan Hand Outcomes Questionnaire scores for all patients are shown in table 4.

In all the scales besides the pain scale, patients with Tubiana grade 3 and 4 with multiple finger involvement had lower scores as compared to patients with Tubiana grade 1,2 with single finger involvement, lower scores indicating poor hand performance. However, even with patients of Tubiana grade 3 and 4 with multiple finger involvement there was 20-40 % improvement in overall hand function after surgery.

Only 19.5 % of the patients experienced pain in the pre-operative period which was different from stiffness which was experienced by all patients. For the pain scale a higher score indicates more pain. In all patients with pain, intraoperative neurolysis was done which resulted in significant reduction in pain scale score by 10-25% at 6 months follow-up. The highest improvement was seen with aesthetics scale with about 35 % increase irrespective of primary closure, STSG or FTG. All patients said that it decreased their social embarrassment that came with the finger contractures and improved their confidence in public.

DISCUSSION:

The prevalence rates of Dupuytren's disease varies from 0.2% to 56% depending on the age and type of population with prevalence increasing with increasing age.⁹

The gender prevalence of patients presenting to our center was male with only one female patient treated so far. Men present with this disease at 55 years of age almost 10 years earlier than women.² In addition, the ratio of males to females affected is 9:1 with disease being milder in the female population, hence it may go unnoticed during lifetime.¹⁰

The prevalence of diabetes mellitus and Dupuytren's disease has been studied widely. According to Agarwal et al¹¹ the prevalence of Dupuytren's disease among diabetic population was 7.2%, whereas it was 84% according to Rajendran et al¹² and 19% according to Pandey et al.¹³ But among the general population the prevalence was 58.6% and 6% according to Rajendran et al and Pandey et al respectively.^{12,13} In our study 28.26 % of the patients were type 2 diabetics.

54.34% of the patients had a history of chronic use of heavy machinery including vibratory tools leading to microtrauma which could have been the underlying cause in these patients. This may explain the possible association with the disease. But risk among higher socio-

economic strata with equivalent intake of alcohol and lower use of vibratory tools remains to be determined.¹⁴

Not much has been studied about the operative outcomes of Dupuytren's disease among the Indian population. There have been only 2 case series published in the past on Indian population given by Srivastava et al¹⁵ and Khan et al.⁵ Srivastava et al studied on 10 patients from the Indian sub-continent in Wordsley hospital, Stourbridge and concluded that the operative findings and subsequent course is similar to the Caucasians.¹³ In their study, regional fasciectomy was done in 80% patients whereas radical fasciectomy was done in 20% patients. Amputation of the ring finger or the little finger was required in 30% of the patients. We also compared our data with study conducted in India by Khan et al.⁵ Their study included 26 males and 4 females. Regional fasciectomy was done in 90% of the patients whereas extensive fasciectomy was done in the remaining 10% of the patients. None of our patients underwent extensive fasciectomy. However, we were able to achieve good results without the need for extensive fasciectomy even in Tubiana stage 3 and 4 patients. Primary suturing was done in 86.67% of the patients and STSG in 13.33 % of the patients in Khan et al. Our complication profile was also comparable (Table 5).

Table 5-Comparison of Complications in Our Study

Complications	Our study (46 patients)	Khan et al (30 patients)
None	78.26 %	83.33%
Hematoma with graft loss	6.52%	3.33%
Infection	-	3.33%
Post op edema and stiffness	8.69%	6.66%
Partial flap necrosis	4.34%	-
Residual contracture	-	-
Recurrence	6.52%	3.33%

Our study with the MHQ may have certain limitations as it is subjective evaluation of the patients views on his recovery and surgical outcome with no comparison to extension deficit in post-operative period. The MHQ was calculated only once at 6 months post-op and there are no sequential scores calculated at various intervals to see for increase or decrease in either scale due to poor follow up of these patients beyond 6 months – 1year. Plus, a single score does not correlate with the incidence of recurrence at a later stage.

However, the percentage improvement in scores of each scale with Regional Fasciectomy was comparable for patients with Tubiana stage 1-2 and Tubiana stage 3-4.

There are several new treatment modalities for Dupuytren's disease like Percutaneous Needle Aponeurotomy (PNA) and Injection Collagenase Clostridium histolyticum (CCH).^{16,17} Needle aponeurotomy (PNA) is a day-time procedure designed for patients with a palpable cord in Dupuytren's contracture. This technique involves inserting a hypodermic needle into the cord to fragment it, followed by manual manipulation to achieve finger extension. Although this method is cost-effective and minimally invasive, it carries a high risk of complications, including digital nerve injury, tendon rupture, skin tears, and chronic regional pain syndrome.¹⁷ Additionally, the recurrence rate of contracture after PNA is notably high, reaching up to 80%.¹⁶

CCH approved by the FDA in 2010, represent a newer treatment option. This method involves injecting collagenase into the cord, which is then followed by passive extension the next day to rupture the cord. This procedure typically requires 1-3 injections over a span of 3 months.¹⁴ Although effective, collagenase is significantly more expensive and this high cost, coupled with the need for multiple follow-ups, makes it challenging for many patients, particularly those from lower socio-economic backgrounds.

In terms of cost, PNA is the most affordable, followed by partial fasciectomy/dermato fasciectomy, with collagenase being the most costly. When assessing recurrence rates, partial fasciectomy and dermato fasciectomy generally offer the best long-term outcomes.

For patients in Indian government hospitals, where cost and accessibility are major concerns, collagenase injections are often impractical due to their high expense and the need for frequent follow-ups, which are difficult for patients from remote villages. PNA, while less invasive and more affordable, is associated with a high recurrence

rate, leading many patients to prefer more definitive surgical options. Given that many patients present with advanced symptoms and have waited years for treatment, partial fasciectomy and dermatofasciectomy remain the primary options. These surgical approaches, despite being more invasive, offer lower recurrence rates and require fewer follow-ups, making them more suitable for the patient population served by government hospitals in India.

CONCLUSION

Our study shows that Regional fasciectomy is equally effective in all stages of Tubiana classification and extensive fasciectomy is not required in advanced stages, thus decreasing the chances of neurovascular injuries. However, the true prevalence of Dupuytren's disease is still unknown due to delayed presentation and prolonged duration of the disease from mild to severe form hampering activities of daily living. Along with the above cause, the lack of knowledge and negligence among the Indian population about this disease has led to patients presenting late and, in a stage, where conservative management is not useful. Hence, even though surgery is an option for Dupuytren's disease, early presentation may altogether avoid the need for surgery. Thus, creating awareness among the public will not only help bring patients early to the hospital but may also help us to determine the true prevalence of the disease and the risk factors associated with it. This in turn may help us bring about newer treatment modalities in the future.

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