Tonometry as an outcome measure for the treatment of early Dupuytren's disease.

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AIM:

To identify an objective measure of palmar nodule consistency to effectively compare clinical outcomes of treatments for early Dupuytren's disease (DD).

BACKGROUND:

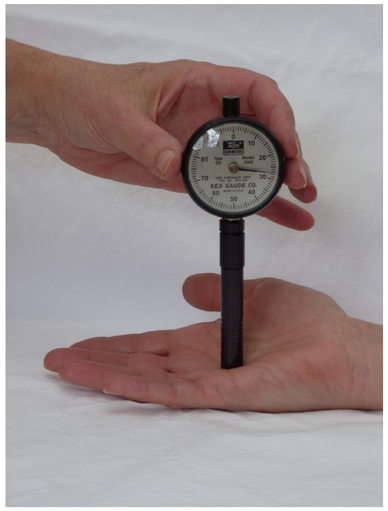
Early DD is characterised by the presence of palmar nodules with limited or no contracture of the digits. Existing literature on outcomes of treatment for early DD relies on subjective clinical assessment, including:

- nodule easier to inject [1]
- fibrosis softer or diminished [2]
- tissue softer [3]
- softening of nodules [4, 5]
- consistency of palpable nodules [6]
- less hard[7]

Tonometry measures the resistance of tissue to compression using a hand-held mechanical gauge. It has been used to evaluate skin compliance before and after surgery for DD[8]. Normal skin, diseased skin and skin over Dupuytren's tissue of 16 patients was measured using an ophthalmic tonometer at baseline and at 2 years following Z-plasty without excision of the diseased fascia. Skin compliance was found to increase following surgery and approach that of normal skin. Tonometry has also been used to evaluate tissue hardness of cutaneous scars, scleroderma and lymphoedema.

METHOD:

Following ethical approval we evaluated the hardness of the skin overlying palmar nodules in patients with early DD compared to the equivalent site of age and sex matched healthy volunteers. A RX-1600-OO Type OO durometer was used, reading in arbitrary units ranging 0-100, with 100 representing maximal hardness. To minimise intra- and inter-observer variability a tonometry protocol was developed and tested by 2 observers with 3 patients with early DD and 2 healthy volunteers prior to commencing the study. Patients with early DD and healthy volunteers were then recruited prospectively to the trial. All patients were assessed by two independent observers using the agreed standardised protocol. Three measurements were recorded for each participant and each assessor was blinded to the scores recorded by the other.



RESULTS:

Thirty seven participants were recruited to the study: 25 patients with DD and 12 age and sex matched healthy volunteers. The ages of the healthy volunteer (mean ± SEM, 61.4 ± 3.1 years) and the patients with DD (64.5 ± 2.1) were similar, as was the ratio of male to female patients in both groups (3:1). The demographics are summarised in Table 1.

Patients with clinical nodules and extensor deficits of ≤30° at the metacarpophalangeal and/or at the proximal interphalangeal joint were recruited, with a maximum total extension deficit of 60°. The tonometry readings for patients with early DD and healthy volunteers were compared using an unpaired t-test. Results are presented in Table 2.

The mean of 3 readings for each observer were compared demonstrating high inter-observer reliability as evidenced by the intraclass correlation coefficient of 0.96 (95% confidence interval 0.942 - 0.967) p <0.0001. (Figure 1)

Table 1

Participants	Patients	Patients mean age (range)	Healthy volunteers	Healthy volunteers mean age (range)
Male	19	64.9 (43 -82)	9	60.2 (49-79)
Female	6	63.2 (54-70)	3	65 (51-72)
Total	25	64.5 (43-82)	12	61.4 (49-79)

Table 2

	Dupuytren's disease, affected hands only (mean ± SEM) n=25	Healthy volunteers, both hands (mean ± SEM) n=12	p value
Tonometry	53 ± 8	32 ± 3	<0.0001
Extension deficit (MCPJ+PIPJ)	11°±20°	1°±2°	0.0018

Figure 1

DISCUSSION:

Our study shows high intra- and inter-observer reliability for assessing tissue hardness in patients with early Dupuytren's disease. This is consistent with previous reports in patients with localised scleroderma[9], hypertrophic scarring[10] and a multicentre RCT of treatment of early systemic sclerosis[11] where a tonometry protocol was used. Utilisation of a robust protocol is recommended and would enable comparison of results between studies.

CONCLUSION:

Our study shows high intra- and inter-observer reliability and our data are consistent with results of previous studies on patients with scleroderma and hypertrophic scarring. Based on our findings we propose that tonometry can be used to objectively evaluate nodule hardness in patients with early DD. Using an inexpensive, portable device we have devised a protocol that is reproducible and has high inter-observer reliability. However, further studies are necessary to assess sensitivity to change following treatment of DD nodules.

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