International Conference on Dupuytren Disease and Related Diseases
71 -17 May, 2025, Brussels , Belgium

A Comparative Longitudinal Observational Cohort Study of Fractionated Superficial Radiotherapy Treatment of Ledderhose

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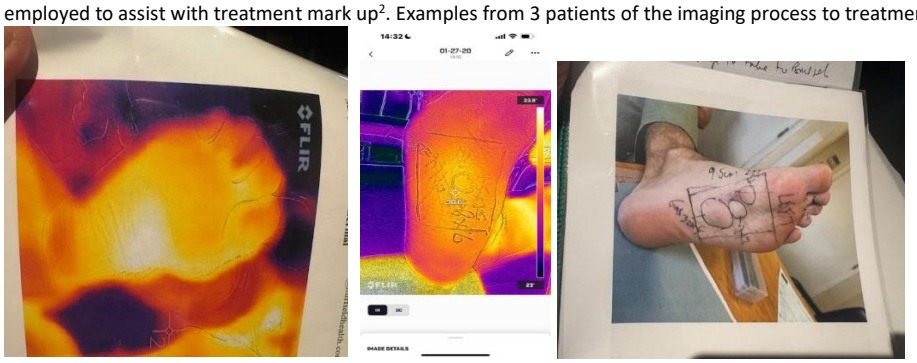
1. HYPOTHESIS

An audit of outcomes of Fractionated Superficial X-Ray Radiotherapy Treatment (SXRT) of progressive Ledderhose disease between January 2007 and June 2021 was undertaken. Its' aim was to compare results with previously reported surgery and radiotherapy studies to determine if improved outcomes had been achieved.

2. METHOD

Treatment details of outcomes of 65 patients (98 feet) treated during this period were audited. Of the 98 feet: from 2007 to 2010, 6 were treated by linac electron beam; and, from 2010 (with SXRT available) to 2021, 92 were treated by SXRT. Some patients, e.g with toe issues, required use of more than one treatment field. DEGRO[1] standard treatment dose fractionation was employed, i.e. Phase I: 15Gy in 5 daily fractions, then a 6 to 8 week gap and, following review, a Phase II repeat of the treatment. From 2011, thermal imaging was often employed to assist with treatment mark up[2]. Examples from 3 patients of the imaging process to treatment mark-uo is shown.



The period of audit was from January 2007 until January 2025, i.e. 18 years, with a minimum cohort follow-up period of 3.5 years (i.e. from July 2021 until January 2025). Recurrences of Ledderhose requiring re-treatment were identified for comparison with outcomes of previously reported studies, namely observation of Ledderhose outcomes post-surgery[3]; and a recent audit of radiotherapy patient treatments for Ledderhose[4].

3. RESULTS

Of the treatments delivered to the 98 feet: 92 were delivered by X-rays (84% @ 100kV; 10% @ 160kV); and the remaining 6 (6%) by electron beam (6MeV or 9MeV, with bolus).
With an SXRT unit available, linac electron beam Ledderhose treatments continued in parallel over a 1 year period before their discontinuation, primarily due to their greater resource requirements.
With use of thermal imaging to assist markup, improved identification of treatment areas and, sometimes, increased margins, resulted.
During the 18 year audit period, the rate of Ledderhose recurrence was low, with only 5 patients (7.7%) and 7 feet (7.1%) requiring re-treatment during this period. The time period for recurrence varied from 5 to 9 years.
Skin dryness and erythema were not major issues with patients and no cancers were induced.
These results compare favourably with a reported post fasciectomy surgery recurrence rate of around 60%[3] and, while a 78% patient satisfaction rate was reported in a 49 month audit of treatment of Ledderhose by radiotherapy, no long term recurrence data was reported in it. nor in other studies[4].

SUMMARY

- Use of SXRT (primarily with a 100kV X-ray beam) for early stage progressive Ledderhose has been found to be efficacious.
- For a mean follow up period of 9 years, recurrence of Ledderhose which required repeat treatment was 7.1%.
- These observational results show a significant improvement over surgery and are the first long term radiotherapy audit results to be reported.
- Improved target identification and margin delineation using an imaging modality (here thermal imaging) may explain these good radiotherapy treatment outcomes.
- It can be concluded that wider application of the SXRT approach described for Ledderhose treatment should improve treatment outcomes.

Reference

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3. Tomac, A et al. Ledderhose disease An up to date review of a rare non-malignant disorder Clin.Prac. 2023 Sep 28; 13(3): 1182-1195. Doi: 10.3390/clinpract13050106

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