Case Studies of Patient Outcomes of Re-Treatment of Recurrent Keloid Tumours by Fractionated Superficial X-Ray Radiotherapy

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Background

A 15–year audit (from 2010 to 2025) of the outcome of treatment of recurrent keloid tumoursby fractionated superficial X–ray radiotherapy (SXRT) was undertaken at Cancer Centre London. The audit result was that, of the 23 keloid recurrences which had developed in the cohort of 158 keloids originally treated,all were found to have been successfully re–treated: the mean period of follow–up was 6–years 8–months (ref.1).

A case series of individual patient outcomes has been selected from the 23 keloid recurrences to illustrate the process and success of re–treatment for a range of: body sites (e.g.earlobe, sternum, etc.);treatment doses;kVs; patient ethnicities; and gender.

Consideration was also given to establishing whether identifiable factors for keloid recurrence were present at initial treatment by surgery and SXRT with a view to establishing whether patients at greater risk of recurrence could be identified and, in turn, monitored by long term follow–up,so facilitating re–treatment at an early stage.

Methods

The radiation dose delivered post–surgery during the initial keloid tumour treatment was 10Gy of SXRT in 1 fraction (#), within 24 hours of keloid surgery.In terms of Biologically Effective Dose (BED), using $\alpha/\beta=3$ for skin, 43.3 Gy_3 was delivered (ref. 2).

When a patient experienced a keloid recurrence, following review,the protocol employed was for a course of SXRT treatment only:4# x 4Gy delivered at 3 monthly intervals over the course of 1 year (i.e. 16Gy in total). However, this treatment was discontinued after 1# (4Gy), 2# (8Gy) or 3# (12Gy), if,following delivery of this level of dose,a successful response were present prior to the next #.

Radiobiologically, for 1#, the BED is 9.3Gy3 and, assuming moderate tissue repair over each 3 month period, 12.6Gy3 for 2#, 13.7Gy3 for 3# and 14.1Gy3 for a full 4# course of treatment over a 12 month period (ref. 3).

Results

14 patients with a total of 23 keloids were successfully treated for keloid recurrence. Some examples of the treatments delivered are summarised in the table below by keloid site, number of keloids, ethnicity, etc.

Examples of Keloid Recurrence Patients Re–Treated with SXRT

Year of Treatment	Patient Gender (M/F)	Patient Ethnicity White(W);Black(B); Asian (A);Mixed Ethnicity(ME)	Number of Keloid Re-Treatment Sites	Location of Keloid(s)	SXRT kV
2011	M	B	2	Sternum; Shoulder	100kV; 60kV
2014	F	A	1	Lt Earlobe	160kV
2017	F	A	1	Lt Nasal Ala	60kV
2019	F	W	1	Sternum	60kV
2021	M	A	1	Lt Cheek	100kV

Notes:

Mean Follow–Up Period = 6years 8months (Minimum:1month; Maximum:13years 4months)
No cancers recorded

Treatment response was assessed prior to each scheduled quarterly treatment, as radiation response is delayed.If a successful response were observed,SXRTwas then discontinued.A successful response was defined as:elimination of the hallmarks of keloid recurrence, i.e. keloid re–growth or red/shiny skin; as well as symptom relief (from itching); and, importantly, patient satisfaction with the cosmetic and functional results. While a degree of thickening remained in treated areas for a minority of patients, they found this to be acceptable.

A review of the case studies was unable to definitively establish any consistent common factors predicting keloid recurrence due to its' limited sample size and the statistical power remaining low. However it was observed that a propensity to recurrence may be associated with: the initial thickness of the keloid; and/or inadequate initial treatment

margins. It was also observed that, when surgical excision then delivery of SXRT were performed for the initial treatment, recurrence may sometimes have been linked to incomplete removal of sutures, or failure of dissolvable sutures. Further data collection is necessary to strengthen these findings.

Conclusions

While limited in scope, this study demonstrates that SXRT, when fractionated at quarterly intervals, is a viable treatment for keloid recurrence with minimal side effects.

No definitive common factors for recurrence were conclusively identified, though initial keloid thickness, initial treatment margins and suture issues may contribute. A larger pooled dataset could help identify high –risk patients for closer monitoring and early intervention.

References

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