ROLE OF BRACHYTHERAPY IN KELOIDS

Keloid scars develops from the minor skin injury. Keloid scars are fibrous benign dermal growths. Hyper-trophic scars should be differentiated from keloids[1,2]. Risk factors that lead to development of keloid scars are dark skin pigmentation, family history, wound infection, chronic wounds, anatomic wound site[3,4].

Treatment of keloids primarily is surgery but recurrence rate after surgery was quite high as 45% to 100%. Surgery followed by radiotherapy has been widely reported as most effective modality of treatment. Reported therapeutic response rate was 67-98%[5].

Biological effective dose (BED) requuired for the treatment of

keloid scars is 30 Gy with less than 10% recurrence rate[6,7].

The LDR interstitial brachytherapy

A method is described for the treatment of the linear keloid scar, by surgical excision and post-operative irradiation delivered locally to the base of the sutured edges of the scar, by an iridium-192 wire. The wire is after-loaded into a plastic tube using the technique described by [Paine (1972)](https://www.sciencedirect.com/science/article/abs/pii/S0009926076801419" \l "bib8). A dose of 2000 rad is delivered at a point 2.5 mm from the axis of the wire, opposite its mid-point. Thirty cases have been treated by this method with a follow-up period of two years or longer; five recurrences were found at six months, and a further one by two years. No complications were observed. It is suggested that this represents a rather lower recurrence rate than has been achieved by other methods, and that the dose to the tissue surrounding the scar is less than that which would be the case with conventional superficial radiotherapy — an important consideration in the treatment of young patients, with benign conditions, by irradiation[8].

 A retrospective review of 544 patients (855 keloids) done in 1993. After complete surgical excision of keloid scar, Ir wire was used to delivered one session of brachytherapy in 547 keloids and 23 received two sessions with an average dose of 10.14 Gy. Reported recuurence rate was 21% after the first and 30.4% after the second treatment. The average follow up for this study was 6.91 years[9].

Another retrospective case on LDR brachytherapy with Ir 192 used as a therapy in keloid tumor published in 3 june 2009. Average dose of 17.9 +/- 2.2Gy at 5mm distance from the wire axis was used. The recurrence rate was 23.6%[10].

HDR interstitial brachytherapy

A seven year prospective study to analyse the results HDR brachytherapy treating the keloid scars with or without surgery. 169 patients with keloid scars were treated with HDR brachytherapy between december 1991 and december 1998. After a follow up of seven year, 8 patients (4.7%) had keloid recurrences. 5 of these had undergone prior surgery and 3 had receeived only HDR brachytherapy. Auther concluded that HDR brachytherapy more successful in patients without surgery and is well tolerated and effective treatment for keloid scars[11].

A single dose of 13Gy HDR brachytherapy after resection of keloid scar was evaluated. It was seen that recurrence rate was 24.1% after a median follow up of 53 months. Recurrence rate was quite high. The only advantage was single day treatment[12].

HDR superficial brachytherapy

A cohort of 139 patients (66 keloid scars) treated with excision and an integrated 90Sr-90Y surface applicator. After surgery Radiotherapy was used within 48 hr with a median total dose of 14 Gy. The recurrence free response rate was 80% and differed between anatomical regions with the face and neck being lowest (2%) and the thorax highest (49%, P < 0.001). Additionally, burns-related keloids had worse outcomes compared to surgical or mechanical trauma-induced lesions (P < 0.001). Regarding adverse effects, 24% patients had acute erythema and 11% hypopigmentation[13].

Ir 192 mould was used in 22 patients with 24 keloids after excision delivering 15 Gy in three fractions. These included two previously treated with surgery, two with surgery and steroid injections and four with steroid injections only. Sixteen keloids were followed up for a minimum of six months with a recurrence rate of 12.5%. One patient had residual keloid after treatment, one grade 1 hypopigmentation and one grade 1 fibrosis. Conclusion of this study was post operative radiotherapy by high dose rate iridium 192 mould was an effective prevention of earlobe keloids recurrence[14].

**PROCEDURE AND DOSE PRESCRIPTION**

HDR Brachytherapy given by making a two layered mold of the operator side and fixed, and two micro catheters were placed between the layers.and 1 cm distance from each other.The mold was firmly strapped to the operated site, such that the catheters were placed at a distance of 5 mm on either side of the suture line. These catheters were then attached to the HDR brachytherapy unit that was kept close to the target, i.e., the suture line. Iridium 192 seeds were passed through it using a remote after-loading technique. Starting on the zero postoperative day a total dose of 20 Gy in four fractions of 5 Gy was administered,, with a minimum of 6 hours gap between fractions and the treatment was completed within 72 hours of surgery. Each fraction was delivered in 5 to 8 minutes.

Sutures were removed when the wound healed well, usually between the 7th to the 10th postoperative day. All patients were routinely prescribed compression garments/pressure earrings.

Patients were followed up weekly for the first 2 weeks, once a month for the first 3 months, then every 3 months for 1 year, and then every 6 months as required. During each visit, any scar widening or hypertrophy, wound-related complaints, skin condition, and recurrence of keloid at the surgery site were noted.

**CONCLUSION**

Brachytherapy is a effective, well tolerable adjuvant treatment for keloid scar. Cosmectic response as well as recurrence free response is high with adjuvant brachytherapy treatment.

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