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Case Series

Surgery Section

Surgical Excision and Postoperative Radiotherapy for Chest Keloids: A Case Series

KOMALA ABHISHEK REDDY[1], ASHISH KUMAR GUPTA[2], SHASHANK LAMBA[3]

ABSTRACT

Keloids are a common fibroproliferative disorder and various medical and surgical treatment options are available for managing them. However, some keloids can be resistant to these treatments. In such cases, the current recommendation is to perform surgical excision followed by early radiotherapy to reduce the risk of recurrence. A retrospective analysis was conducted on patients who underwent keloid excision at a tertiary care centre between January 2011 and December 2020. The study included 10 patients (2 females, 8 males) with a mean follow-up period of five years. Unfortunately, all keloids recurred, with the average time to recurrence being approximately two years postsurgery. After a recurrence, all patients received conservative management. It is suggested that ethnicity may contribute to the high recurrence rate observed. Further studies, including randomised controlled trials from the Indian subcontinent, are needed to determine the most effective treatment options for keloids.

Keywords: Fibroblasts, Radiation, Scars, Skin graft, Surgery

INTRODUCTION

Keloids are fibroproliferative disorders in the reticular dermis that result from prolonged inflammation after trauma. Very few studies are available on the incidence of keloids. The incidence of keloids is 5% in Africans, 0.1-1% in Asians and less than 1% in Europeans and North Americans [1]. This difference in the prevalence of the disease may be due to genetic and ethnic factors [2].

None of the surgical or medical treatments can permanently remove keloids while restoring the aesthetic appearance of the affected skin. Despite extensive research, keloids remain refractory lesions. Therefore, multiple single or combined modality treatment options are available, which include intralesional corticosteroid injections, 5-fluorouracil (5-FU), silicone gel sheets, compression therapy, cryotherapy, surgery and radiation. Surgical intervention is performed after the failure of medical management [3]. Surgical intervention alone has a recurrence rate of 45-100% [4]. The recurrence rate decreases when combined with postoperative radiotherapy [1].

Postoperative (adjuvant) radiotherapy significantly reduces the recurrence rate with a low risk of carcinogenicity. Electron beam radiotherapy, brachytherapy and photon beam therapy are the standard radiation delivery techniques. The efficacy of these radiation modalities is comparable for keloids and each modality has its advantages and disadvantages [5].

CASE SERIES

Keloids were primarily managed conservatively through intralesional therapies. The earlobe was the most common site, showing a good response to these conservative treatments. A total of 36 patients had presternal keloids; however, these did not respond to conservative management. Among these, 25 patients refused consent for radiation exposure. A total of 11 patients underwent excision followed by adjuvant radiotherapy, but two of them did not attend follow-up appointments regularly. As a result, only nine cases of presternal keloids were included in the present study, along with one refractory thigh keloid, which featured a long follow-up period [Table/Fig-1]. Following the excision of the keloid, either primary closure was performed or a skin graft was applied. Patients were started on 16-24 Gy of external beam radiotherapy within 24 hours of excision, administered in divided doses over 4 to 5 days. The Biologically Effective Dose (BED) was more than 30 Gy for all patients, as recommended in the literature [6]. Follow-ups were conducted with patients to monitor for recurrence of symptoms. A few representative cases have been presented in [Table/Fig-2-4].

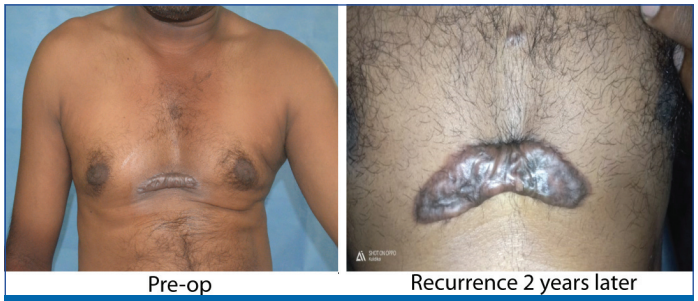
The following are examples of a few other cases that had symptomatic improvement followed by a recurrence of symptoms [Table/Fig-5].

S. no.	Age	Gender	Site	Duration of Keloid (years)	Size (cms)	Adjuvant RT dose (BED)	Follow-up
1	53 y	Male	Presternal	8 years	13×4 cm	16 Gy in 4 fraction	1 year + Donor thigh scar tenderness
2	22 y	Female	Presternal	2 years	6×7 cm	16 Gy in 4 fraction	70% Recurred in less than 1 year
3	28 y	Female	Presternal	7 years	15×12 cm	20 Gy in 4 fractions	Recurrence in 3 years
4	22 y	Male	Presternal	4 years	7×7 cm	20 Gy in 4 fractions	Recurrence in 6 months
5	52 y	Male	Presternal	20 years	20×20 cm	24 Gy in 5 fractions	Recurrence in 9 months
6	38 y	Male	Presternal	5 years	11×7 cm	20 Gy in 5 fractions	Recurrence in 1 year
7	39 y	Male	Presternal	16 years	8×4 cm	18 Gy in 4 fractions	Recurrence in 4 years
8	37 y	Male	Presternal	2 years	6×2 cm	16 Gy in 4 fractions	Recurrence in 2 years
9	23 y	Male	Presternal	3 years	8×6 cm	20 Gy in 4 fractions	Recurrence in 4 years
10	40 y	Male	Left thigh	20 years	15×10 cm	24 Gy in 5 fractions	Recurrence in 2 years

[Table/Fig-1]: Recurrence of lesion in all patients following excision and adjuvant radiation.

[Table/Fig-2]: Young lady had recurrence of keloid following excision of keloid and adjuvant radiotherapy (Case 1).

[Table/Fig-3]: Large keloid recurrence following surgical excision and adjuvant radiotherapy (Case 2).



[Table/Fig-4]: Small Keloid recurrence following excision and closure with adjuvant radiotherapy (Case 3).

Donor site morbidity: A few patients were found to have keloid formation at the donor site [Table/Fig-6]. Since this finding was not present uniformly in all patients, it may be due to probable deeper dermal involvement at the sites.

[Table/Fig-5]: Other cases.

[Table/Fig-6]: Skin graft donor site scars over thigh.

Radiotherapy-related side-effects: Three patients experienced temporary pigmentation. No other obvious radiation-related adverse effects were noted. A negligible risk of carcinogenicity has been reported in the literature.

DISCUSSION

Surgical intervention is considered when initial treatment options prove ineffective. Surgical intervention without adjuvant treatment has a recurrence rate of 45-100% [4]. Common surgical procedures include the double-layer intradermal continuous suture technique, local flaps and skin grafts. Adjuvant radiotherapy is commonly administered, as meta-analysis show that it reduces recurrence [2].

Three radiation modalities are utilised in the literature: superficial X-ray, electron beam and brachytherapy. All the patients received electron beam radiotherapy within 24 hours, a timeframe supported by most published data. Lee JW and Seol KH observed a lower recurrence rate when patients began radiotherapy within 24 hours compared to 72 hours [7]. Similarly, brachytherapy showed a better response when started within seven hours than when initiated within 24 hours [8]. However, a recent meta-analysis reveals that the initiation of adjuvant radiotherapy after 24 hours should not significantly affect keloid recurrence [9].

The surgical method and tension-free closure should be compatible with radiotherapy. Small keloids are treated with double-layer intradermal continuous suturing, medium keloids with local flaps and large keloids (<10 cm) with microvascular flaps or skin grafts [10]. Based on recurrence rates, a site-specific classification has been proposed. The anterior chest wall, scapular and suprapubic regions are considered high recurrence areas; ear keloids fall into the second category, while all other keloids are included in the third category. Therefore, a site-specific radiation dose should be planned [1]. Ogawa R et al., noted that the recurrence rate reduced from 43.1% (1998-2000) to 10.6% (2012-2017) by increasing the radiation therapy dose from 15 Gy/3 Fr/3 days to 18 Gy/3 Fr/3 days [6]. Bischof M et al., reported a 36% recurrence following sternal keloid excision and primary closure with adjuvant radiotherapy [11], while Lee SY and Park J, indicated that two out of three sternal keloids recurred [12].

Skin grafts are not commonly used following keloid excision and are reserved for situations when primary closure or flap options are not possible. The literature describes the use of both full-thickness and split-thickness skin grafts. The advantage is that they provide tension-free closure. However, the disadvantage is keloid formation at the donor site, which is proportional to dermal injury [13].

Pachuau L et al., administered 21 Gy in three sessions after 72 hours of surgery, reporting a 100% cure rate, which included both fully cured (94.5%) and partially cured scars. They excised the

superficial and middle dermis, preserving the reticular dermis to prevent tension and aid graft take [14]. Li W et al., introduced a meticulous precut technique, involving an incision made up to the subcutaneous tissue at the periphery of the keloid. Radiotherapy was administered the next day and keloid excision and grafting were performed on the following day. Adjuvant radiotherapy was given 10-14 days later. This careful approach resulted in a significantly lower recurrence rate (16.7%) compared to 55.2% in the conventional group, providing reassurance for the effectiveness of the technique [13]. Long X et al., showed no recurrence in large keloids (>10 cm^2) with sandwich therapy/precut therapy [15].

In the present study, the recurrence rate is 100%, which is unusually high even for sternal keloids. The authors speculate that the high recurrence rate may be attributed to the keloid's large size, the definition of recurrence and ethnicity. Hsieh CL et al., observed a high recurrence among keloids larger than 5 cm. In the present study, most of the keloids were larger than 5 cm [9]. Ogawa R et al., did not find any difference based on the size of the keloid [16]. We employed the recurrence definition described by Ogawa, which includes any elevation and stiffness of the scar, with or without redness, irrespective of size and patient satisfaction was considered in the recurrence [16]. The authors definition of recurrence contrasts with other studies that use terms like "cured" and "partially cured" [11,14]. The authors also believe that ethnicity may contribute to the high recurrence rate, contrary to Ogawa's opinion [6]. They feel that more randomised controlled trials from India are required to compare the conventional techniques of keloid excision, grafting and adjuvant therapy with precut/sandwich techniques to clarify keloid treatment.

CONCLUSION(S)

Keloid excision combined with skin grafting, followed by adjuvant radiotherapy, is a viable option for keloid management. The adverse effects related to radiation have been found to be minimal. Since recurrences occur gradually, further studies with long-term follow-up are recommended to better understand the efficacy of this treatment modality.

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PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Plastic Surgery, Christian Medical College, Vellore, Tamil Nadu, India.
2. Professor, Department of Plastic Surgery, Christian Medical College, Vellore, Tamil Nadu, India.
3. Professor, Department of Plastic Surgery, Christian Medical College, Vellore, Tamil Nadu, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Komala Abhishek Reddy,
Assistant Professor, Department of Plastic Surgery, Christian Medical College,
Vellore-632002, Tamil Nadu, India.
E-mail: karonline@gmail.com

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