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Case Reports

Radiotherapy for Recurrent Keloid: A Case Report

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Abstract

Background: Keloid is a benign growth of connective tissue. Several risk factors play a role in keloid growth. Excision surgery is one of the modalities in the treatment of keloids. However, excision surgery alone has a recurrence rate of 45-100%. Radiotherapy destroys fibroblast, leads to decreased production of collagen and suppressed keloid formation. A study stated that administration of postoperative radiation with electrons in keloids on the earlobe at a dose of 15 Gy in three fractions gives a low recurrence rate and a low risk of side effects in the surrounding soft tissue.

Case Presentation: We present a case of recurrent keloid lesion in the left earlobe with a history of previous injuries. The lesions was operated on, but always grows back postoperatively. The numbers of surgeries that have been carried out three times with further treatment in the form of corticosteroid injection. However, keloid still recurrence. Finally, it was decided to undergo treatment with surgery followed by radiotherapy within no more than 24 hours postoperatively. Radiotherapy as adjuvant therapy for postoperative keloid excision has the role of sterilizing the connective tissue stem cell active fibroblasts and acute inflammatory cells that grow in the early postoperative period. Follow-up after one year gave good results local control without recurrence.

Conclusion: Radiotherapy within no more than 24 hours postoperatively for keloids recurrent represents a safe and effective option for control keloid regrowth.

Keywords: keloids; recurrence; radiotherapy

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INTRODUCTION

Keloid is a benign growth of connective tissue with a collagen structure due to an imbalance in the wound healing process on the skin.¹ Keloids are often refractory to treatment, recurring frequently. The precise etiology and genetic mechanisms of this pathology are still unknown. Familial keloids seem to represent an incomplete penetrance autosomal dominant disease, with varying degrees of clinical severity within a pedigree.^{2,3}

Several risk factors play a role in keloid growth after wound healing, such as genetic factors as the main risk factors, melanin, anatomical location, type of injury to the skin, age, sex, and blood type, people with blood group A have high probability to develop keloids compared with other blood groups.^{4,5}

There is a clear genetic component given the correlation with family history, which supported by the following phenomena. First, some patients with keloids report a positive family history. Second, there is high occurrence in identical twins. Third, there is a higher predisposition in Blacks, Hispanics, and Asians, less frequently in Caucasians. Fourth, increased incidence of keloids in patients with some genetic syndromes like Turner syndrome, Opitz-Kaveggia syndrome, Rubinstein Taybi syndrome, and Ehlers Danlos syndrome.⁵

Most keloids occur three months after injury and some cases occur at a distance of one year or more. Keloids appear as firm tumor, mildly tender, with a shiny surface. Keloids are often pruritic and painful, in addition to the significant effects of a patient's quality of life, both physically and psychologically, especially in excessive scarring.⁶

Excision surgery is one of the modalities in the treatment of keloids. However, excision surgery alone

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has a recurrence rate of 45-100%. Surgical excision followed by radiotherapy is a helpful treatment option for large and more difficult-to-treat keloids that cannot otherwise be treated by or have failed more conservative measures. The balance between proliferation and apoptosis is impaired in keloid fibroblasts, and because keloid fibroblasts are sensitive to x-ray irradiation, it is thought that x-ray radiation may prevent the recurrence of keloids by controlling fibroblast proliferation, arresting the cell cycle, and inducing premature cellular senescence.⁷

Because of the long irradiation waiting list and limited radiotherapy center in Indonesia, it has never been reported about the use of radiotherapy for keloid in Indonesia. In addition, the treatment for keloid requires specific radiotherapy equipment, electron beam – LINAC (Linear Accelerator). We used comparison case from other countries in Asia. Herewith we present an evidence-based case report of the utilization of radiotherapy as an adjuvant treatment for keloid after surgery.

CASE REPORTS

A 37-year old Asian man presented with a left ear lobe benign tumor (keloid) for 3 years ago with wound history. The patient has a history of keloid formation in the chest region with recalled dermal injury or abrasion before about 5 years ago, but the keloid did not grow rapidly. There is no patient's family history of keloid. The risk factor was not also notable for blood type. In physical examination revealed that keloid was firm, pliable growth, 9 cm in its greatest diameter, dark brown color, with an irregular shape, and itchy. The keloid dimension is about 3 x 3 x 9 cm, which caused the patient considerable discomfort (Figure 1A). Past medical history evinced numerous heterogeneous treatments for his ear lobe keloid. He had previously received three times surgical extirpation and eight times steroid injections (once per month). Despite these interventions, his keloids have either recurred or persisted after 1 – 6 months follow up. Surgical extirpation was undertaken but histopathology examination never performed. The keloid dimension post-surgical is about 1 x 1 x 3 cm. On the day following the fourth surgical excision (eight hours after excision), the patient was treated with radiotherapy using an electron at 10 MeV. The total dose delivered was 15 Gy in 3 days, with a daily fraction of 5 Gy. Plasticine was used to cover the ear lobe with 1 cm thickness and had a role as bolus and tissue compensator. Thermoplastic mask was also used as head fixation during radiation therapy (Figure 1B). There was no acute radiation side effect on his skin during treatment and at 1-month post-therapy. The patient also reported no difficulty attributable to the lesion post radiation therapy. At one year after completion of radiation treatment for his ear lobe keloids, the patient returned for a follow-up examination. No complications and late side effects have been noted. The excision combined with radiotherapy gave good results without recurrence (Figure 1C).

DISCUSSION

Keloid is a benign fibro-proliferative growth distinguished by excessive collagen deposition and has a high recurrence rate after excision surgery. Excision

surgery alone has a recurrence rate of 45-100%. Even the surgery followed by the administration of corticosteroid injection the recurrence rate is not better than surgery followed by radiotherapy.⁸ In this case, the patient underwent three-time surgery and corticosteroid injection eight times but his keloids have either recurred or persisted after 1 - 6 months follow up.

Radiotherapy as adjuvant therapy for postoperative keloid excision has the role of sterilizing the connective tissue stem cell, active fibroblasts, and acute inflammatory cells that grow in the early postoperative period. The radiotherapy treatment aims to restore a balance between collagen formation and breakdown.⁹ In this case, the patient underwent radiotherapy on the day following the fourth surgical excision to sterilize the connective tissue stem cell, active fibroblasts, and acute inflammatory cells that grow in the early postoperative period. Shen J, et al Study showed that there was an increased relapse rate in person whom radiation occurred more than 24 hours after surgery.¹⁰



Figure 1. (A) Preoperative view. (B) Thermoplastic mask with plasticine used during treatment. He underwent surgical excision, immediate radiotherapy with a dose of 15 Gy in three fractions was initiated eight hours on the day after the operation. (C) One year postoperatively, no recurrence of the lesion was noted.

Meta-analysis was performed including only post excisional radiotherapy studies. Keloids site on the chest wall higher relapse rate compared with keloids in earlobe (HR= 1.91, 95% CI: 1.26–2.89, $P < 0.01$).¹¹ The lowest recurrence rate of 15% was found for brachytherapy with 23% for electron beam and 23% for X-ray Therapies. Recurrence rate comparison between electron beam and brachytherapy was statistically insignificant (OR, 1.81; $P = 0.10$), but recurrence rate comparison between X-ray and brachytherapy was statistically significant (OR, 1.94 ; $P = 0.04$).¹² In this case, electron beam was performed because the contour of the ear lobe surface cannot be reached maximally for brachytherapy.

A study states that administration of postoperative radiation with electrons in keloids in the earlobe at a dose of 3 x 5 Gy gives a low recurrence rate and a low risk of side effects in the surrounding soft tissue compared to high doses radiation per fraction.¹¹ A large study with a higher total dose, 18 Gy in two fractions, showed no radiation-induced malignancies were observed after a median follow up of 40 months, and there was a low adverse effect profile of 9.38 percent.¹¹

CONCLUSION

In this case, radiotherapy within 24 hours of keloid excision has a low recurrence rate compared to surgery or surgery followed by the administration of corticosteroid injections to controlled regrowth. The administration of electron beam radiotherapy with a total dose of 15 Gy in post excision ear lobe keloid gave good results without recurrence in follow-up after one year.

The Authors suggest that the patient must do the follow-up examination at least four times a year to evaluate the late side effect of radiation therapy and the possibility of recurrence after complete treatment.

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