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CASE REPORT

# Surgical Excision and Radiotherapy for Giant Keloids in Auricula: A Case Report

Shinta Fitri Boesoirie[1], Retno Arun Winastuti[1], Agung Dinasti Permana[1], Novan Arya Yudistira[1], Vesara Ardhe Gatera[2], Muhammad Thaufiq Boesoirie[1]

[1]Department of Otorhinolaryngology-Head and Neck Surgery, Faculty of Medicine Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital, Bandung, West Java, Indonesia; [2]Department of Biological Pharmacy, Faculty of Pharmacy, Universitas Padjadjaran, Jatinangor, West Java, Indonesia

Correspondence: Shinta Fitri Boesoirie, Department of Otorhinolaryngology-Head and Neck Surgery Faculty of Medicine Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital, Bandung, Indonesia, Tel +62 22 84288828, Email shinta.fitri.boesoirie@unpad.ac.id



**Abstract:** Keloids are characterized by excessive growth of fibrous tissue resulting from abnormal wound-healing processes. They may lead to functional impairments, aesthetic deformities, pruritus, and a decreased quality of life. Various therapies, including intralesional corticosteroid injections, cryotherapy, laser therapy, surgical excision, and radiotherapy, have been used to manage keloids, but the recurrence rates remain high. Therefore, this study aimed to report combination therapy for patients with giant keloids in auricula. This report presents a 35-year-old man who had lumps in both ears that got bigger over about 10 years. Surgery was done to remove the keloids and to fix both ears. After surgery, the patient got some radiotherapy, specifically a kind called superficial brachytherapy, to try to lower the chances of the keloids coming back. A combined way of doing surgery and giving radiotherapy showed it could work well for handling big ear keloids and keeping them from coming back. The extra radiotherapy after surgery helped a lot in lowering the chances of the keloids showing up again.

**Keywords:** auricular keloids, surgical excision, radiotherapy

## Introduction

Keloids often form months or even years after skin trauma, such as cuts, infections, or surgeries. Their development is due to extended inflammatory and proliferative phases, which cause an excessive buildup of collagen. Genetic and environmental factors also play important roles in this pathological process.[1,2] Various therapies have been used to manage keloids, including intralesional corticosteroid injections, cryotherapy, laser therapy, surgical excision, and radiotherapy. However, the high recurrence rate (> 50%) remains a challenge. Most studies reported that the recurrence rate after surgical excision can reach 50%–80% without adequate adjuvant therapy.[3]

Radiotherapy is an effective adjuvant therapy after surgical excision, which functions by inhibiting fibroblast proliferation and excessive collagen synthesis, thereby preventing keloid formation. Studies have shown that radiotherapy significantly reduces the recurrence rate compared with other therapies (steroid or cryotherapy). According to recent reports, hypofractionated radiotherapy with a biologically effective dose (BED) of > 28 Gy is highly recommended for local control with tolerable side effects.[1,2] Therefore, this case report describes the application of combination therapy in a patient with giant keloids of auricle.

## Case Presentation

A 35-year-old man complained of a lump in the right and left earlobes. The lump had been there for 10 years, Additionally, pimples had appeared behind both ears and had gradually increased in size over time (Figure 1). The patient did not experience any pain, but the lump was itchy, and similar lumps had appeared across the body since the age of 10, attributed to a chickenpox infection. The patient had undergone keloid excision on his chest in the 3rd grade of

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**Figure 1** The Pimples behind the Ear.

elementary school; however, after the excision, the lump on his chest increased in size. The patient had a history of treatment in 2010 with injection and laser therapy by a dermatologist but did not continue the therapy.

There was no history of diabetes mellitus, hypertension, allergies, or regular medication use. Physical examination showed that the patient's general condition was composition, calm, and afebrile, with a blood pressure of 110/70 mmHg, pulse rate of 86 beats/min, respiration rate of 19 breaths/min, and body temperature of 36.7°C. During the local examination, the right and left auricles were calm, there was no secretion or cerumen, the tympanic membrane was intact, the light reflex was positive, and the retro auricle was calm. A solid mass measuring 10×8 × 6 cm in the right auricle and 7×5 × 4 cm in size was palpable with a bumpy surface, skin-colored, and attached to the posterosuperior auricle (Figure 2). The examination of the right and left nasal cavities showed a calm mucosa without secretion, no septal deviation, eutrophic inferior concha, and decreased air passage. Oropharyngeal examination showed T1-T1 tonsils were calm, the pharynx was calm, and there was no palatal bulging, masses, postnasal drip, or polyps. The maxillofacial examination was symmetrical, and there was no cranial nerve paresis. Enlarged lymph nodes were not palpable in the neck.

The diagnosis was bilateral auricular keloids, and a reconstruction procedure was performed on both the right and left auricles under general anesthesia. The patient was told not to eat for 6 hours before the surgery and was given IV fluids (RL 1500 cc/24 h) while the vital signs were checked. After surgery, the patient was still under the effects of the meds, with blood pressure at 100/70 mmHg, pulse at 70 beats per minute, breathing rate at 19 breaths per minute, and body temperature at 36.6°C. The surgical wound was covered with a bandage, and there was not any leaking or bleeding seen. After surgery, the diagnosis was large keloids, though neurofibromatosis was also thought about as a possible cause in both ear areas. The keloids were taken out, and both the right and left ears were fixed up. The care plan included checking vital signs and keeping an eye out for bleeding, giving IV fluids (RL 1500 cc/24 h), keeping the patient fasting


**Figure 2** Solid Mass (Keloid) on the Right (**a**) and Left (**b**) Earlobe.

until fully awake, then moving to a regular diet, setting up a consult for radiotherapy, changing the dressing on the first day, waiting for pathology results, and doing regular blood tests.

The patient underwent histopathological examination, and the right and left auricle preparations were covered with keratinized stratified squamous epithelium and nuclei in the normal limits. The sub-epithelium consisted of proliferative fibro-collagen connective tissue stroma, some of which underwent hyalinization with haphazardly arranged collagen accumulation. Lymphocyte inflammatory cell infiltration was accompanied by blood vessel dilation, fat tissue with mature fat cells, and cell nuclei at the edge within normal limits, with no signs of malignancy (Figure 3).

The next step in the treatment plan was radiotherapy, administered at a dose of 3.5 grays per fraction, totaling 17.5 grays, which is equivalent to a biological effective dose of 20 Gy. Radiotherapy is more efficient because it is only performed five times compared to external radiation with an electron dose of 20×2 Gy, equivalent to 40 Gy. This therapy aims to suppress fibroblast growth for a maximum of 48 hours after surgery in the fibroblast phase, and this procedure significantly reduces the recurrence rates (Figure 4).

At the three-month post-radiotherapy follow-up evaluation, the treatment outcome showed excellent results. The physical examination showed complete resolution of keloid masses with no evidence of protrusion or recurrence. Surgical sites demonstrated optimal healing with minimal scarring. The skin texture surrounding the operative areas appeared normal, with slight erythema indicating an ongoing healing process. The combination of surgical excision and radiotherapy has proven to be highly effective in this case, as shown by the absence of keloid recurrence and the satisfactory aesthetic outcome.

## Discussion

The exact reason for the formation of keloids is not completely understood. However, some factors have been found to increase the risk, including gender, race, and family history.[4,5] In this case, the patient was a 35-year-old man. Studies show that keloids are found more in men than women. This could be because men might get more skin injuries or do things that increase the risk, like playing sports or doing physical work. Also, men might have more skin damage from shaving, especially on the face and neck, which could lead to keloids. The rate of keloids seems to vary noticeably between men and women based on sex. Lee et al reported that while men are more likely to get keloids, women can also

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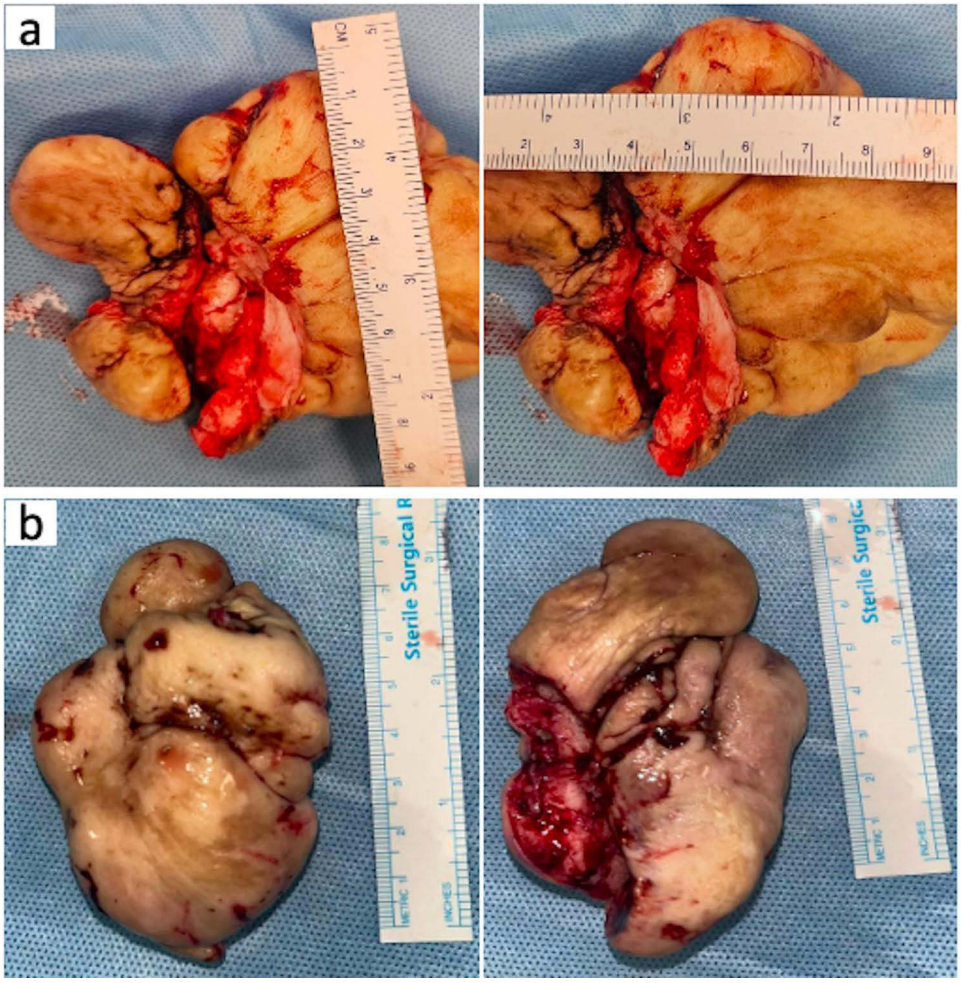


**Figure 3** Keloid after Excision on the Right (**a**) and Left (**b**) Earlobe.

get them. Women might get keloids in places that often get hurt or have cosmetic treatments, like the ears from piercings or the face from surgeries.[3]

In this case, the patient had a family history of the same condition. From a genetic point of view, people with family members who have keloids are more likely to get them. Tsai et al and Marella et al demonstrated that keloids often occur in families, indicating a genetic factor in their development that may elevate the risk of keloid formation.[6,7] For example, variants in genes that regulate the inflammatory response and wound healing, such as TGF-β (Transforming Growth Factor-beta (TGF-β), VEGF (Vascular Endothelial Growth Factor), hyper-IgE syndrome, and blood type A, are associated with an increased risk of keloids. Subsequently, TGF-β plays an important role in fibroblast proliferation and is more active in the production of excessive collagen. This suggests that genetic predisposition plays a role in determining how the body responds to skin injury and the wound-healing process.[6,8–10]

In this case, the patient first experienced lumps in the right and left earlobes at the age of 25 years. During this period, keloids continued to grow and caused aesthetic problems and itching, with no signs of regression despite several previous treatment attempts. Keloids are chronic conditions characterized by the excessive and persistent growth of scar tissue, continuing even after the original skin injury has healed. Various factors contribute to the chronic nature, slow healing, and progressive tendency of keloids, as illustrated in the case of a patient who experienced keloid formation for over 10 years. One of the main reasons why keloids are chronic is the imbalance in the wound-healing process. Under normal circumstances, skin wounds undergo three phases of healing: inflammation, proliferation, and remodeling. However, in


**Figure 4** Post Radiotherapy on the Right (**a**) and Left (**b**) Earlobe.

keloids, the inflammation and proliferation phases last longer and are uncontrolled, leading to excessive accumulation of collagen and other extracellular matrix components.[9–13]

Surgical intervention is a primary option for managing keloids, particularly large keloids that cause functional or aesthetic issues. Excision surgery targets the direct removal of keloid tissue; however, when used as a standalone treatment, it has significant limitations. Maliha et al and Lee et al show the recurrence rate of keloids after surgical excision alone is very high, reaching 45–100%. Surgery can trigger a new inflammatory response that stimulates the formation of additional keloids. Surgical excision is often combined with adjuvant therapy to reduce recurrence risk of recurrence.[1,2]

The keratinized stratified squamous epithelial layer in the right and left auricle preparations, with cell nuclei in normal limits, indicated that the skin surface did not undergo serious pathological changes. This normal epithelium indicates that keloids are benign and noninvasive. Hyalinization indicates that some parts of the stroma have become denser and more homogeneous owing to protein accumulation, indicating a poorly coordinated and uncontrolled wound-healing process. The haphazard or random arrangement of collagen is the main diagnostic feature of keloids. This irregular arrangement of collagen differentiates keloids from hypertrophic scars, in which collagen is usually arranged more regularly and parallel to the skin surface. The random arrangement of collagen reflects an abnormal and excessive healing process.[1,14]

The presence of inflamed lymphocytes and widened blood vessels suggests that keloids have a strong inflammatory part. The inflammatory cells and expanded blood vessels show that the body is responding unusually to the healing process.[14] Finally, fat tissue, which has mature fat cells with their nuclei on the edges, stays normal. This shows that even though there is too much growth of fibroblasts and collagen, the fat tissue structure stays the same and is not affected. In this case, keloids happen because of unusual wound healing, with more collagen being made and a lot of inflammation.[1,14]

Adjuvant radiotherapy after surgery helps lower the chances of keloid coming back. Radiotherapy works by stopping fibroblast growth and collagen production, which are key parts of keloid formation. Radiation slows down the growth of

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fast-growing cells like fibroblasts, mesenchymal cells, and inflammatory cells, which helps stop too much scar tissue from forming.[11]

In this case report, the patient was scheduled to undergo five radiotherapy sessions with a dose per fraction of 3.5 Gy, and a total dose of 17.5 Gy which is equivalent to a biological equivalent dose (BED) of 20 Gy. Radiotherapy was carried out using the superficial brachytherapy method to lower the chance of keloid coming back. It focused on an area 0.5 cm below the skin surface around the surgery site. Lee et al and Lee et al have shown that the combination of surgical excision and radiotherapy can provide excellent local control with a lower recurrence rate than surgical excision or radiotherapy alone. The recurrence rate after surgery and radiotherapy was found to be less than 20%. Different radiotherapy methods have been used, with the suggested total dose being between 12 Gy and 20 Gy. Recent data suggest that the use of radiation doses with a BED (Biologic effective dose (BED) of > 30 Gy provides better long-term control.[2,3]

Radiotherapy is usually started on the same day as surgery or within 24 hours after. This timing makes sure the radiation targets tissue that is still immature and sensitive to radiation, which may give a better treatment result compared to using radiation on mature tissue. Lee et al and Lee et al have also shown that a short interval between surgical excision and adjuvant radiation therapy can improve disease control.[2,3]

This case report demonstrates the effectiveness of combining surgical excision with radiotherapy. This approach is in line with recent evidence showing successful outcomes in treating challenging keloid cases through combination therapies. Similar to the findings reported in recent literature, where intralesional excision combined with cryosurgery showed promising results in treating oversized and therapy-resistant keloids with no recurrence over an 18–24 month follow-up period.[15] This case utilized radiotherapy instead of cryosurgery, both approaches share the fundamental principle of combining surgical intervention with adjuvant therapy to minimize recurrence risk. The successful treatment of auricular keloids, particularly in post-burn cases, has been documented to significantly improve patient outcomes, including appearance satisfaction and quality of life parameters.[16] This case further supports the observation, as the combination of surgical excision and radiotherapy resulted in satisfactory aesthetic outcomes and no recurrence during the follow-up period.

Surgical excision combined with radiotherapy for auricular keloids represents a well-established treatment technique, though the management of these lesions remains challenging due to their high recurrence rates. The literature suggests that auricular keloids have a significant psychosocial impact on patients' quality of life, with an incidence rate of 2.5% following ear piercing.[17] While this case report utilized surgical excision with adjuvant radiotherapy, it is important to note that various therapeutic options exist, including intralesional corticosteroids, verapamil, compression therapy, and novel techniques such as intralesional cryosurgery. The success of this case report's treatment is in line with current evidence showing that combination therapy typically yields better outcomes than single-modality treatments. This is particularly relevant for giant auricular keloids, which are more resistant to treatment and have higher recurrence rates. The anatomical complexity of the ear, characterized by its delicate cartilage framework and thin skin coverage, requires meticulous surgical planning to minimize complications and achieve optimal aesthetic results. This case report technique of combining surgical excision with immediate post-operative radiotherapy follows the principle of targeting both the mechanical and biological aspects of keloid formation, potentially reducing the risk of recurrence through the radiation's anti-fibroblastic effects.[18]

The use of steroids, particularly intralesional triamcinolone acetonide (IL TAC), remains a cornerstone in keloid treatment. IL TAC demonstrates consistent clinical improvement through multiple mechanisms, including suppression of dermal inflammation, vasoconstriction-mediated oxygen reduction, and antimitotic effects on keratinocytes and fibroblasts. The optimal dosing appears to be between 20–40 mg/mL, with treatment intervals of approximately 2 weeks showing the most significant reduction in keloid volume. The effectiveness of steroid treatment appears to be influenced by keloid morphology, with sessile lesions showing better response compared to pedunculated variants.[19]

Regarding cryotherapy, this modality functions by causing irreversible cellular damage through temperature reduction, effectively transitioning keloidal fibroblasts toward a more normal phenotype and improving the type 3 to type 1 collagen ratio. The combination of cryotherapy with other treatments, such as intralesional TAC or verapamil, has demonstrated enhanced outcomes.[18]

This study has several limitations that should be considered. As a single case report, the results cannot be generalized to a broader population of keloid patients, and the long-term outcomes beyond the immediate post-treatment period remain uncertain. Future investigations would benefit from prospective, controlled studies with larger patient cohorts, longer follow-up periods, and standardized assessment protocols to better establish the optimal combination of surgical excision and radiotherapy for giant auricular keloids.

## Conclusion

In conclusion, the combination of surgical excision and radiotherapy has shown excellent results in managing giant auricular keloids. Surgical excision followed by adjuvant radiotherapy significantly reduced the recurrence rate of keloids, which was often high when surgical excision was performed alone. Radiotherapy performed in 24–48 hours after surgery provided better local control and suppressed fibroblast growth, which was a major factor in keloid formation. The superficial brachytherapy technique was also shown to be efficient and had side effects that were well-tolerated by patients. This combination therapy not only reduced the frequency of recurrence but also improved the quality of life of patients by reducing the functional and aesthetic disturbances caused by keloids. This study emphasized the importance of combination therapy in the management of large and complex keloids.

## Abbreviations

BED, Biologically effective dose; Cm, Centimeter; Gy, Gray; IgE, Immunoglobulin; mmHg, millimeters of mercury; TGF-β, Transforming Growth Factor-beta.

## Ethics Statement

Our institution does not require ethical approval for reporting individual cases or case series.

## Patient Consent

Informed written consent was obtained from the patient for publication of this case report and accompanying images.

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## Disclosure

The authors declare no conflicts of interest in this work.

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