

CASE REPORT

Surgery and superficial x-ray radiotherapy for keloids of the preauricular and contralateral ear lobe: Case report

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Key Clinical Message

The combined approach of surgical resection along with superficial x-ray radiotherapy emerges as a superior treatment option for individuals with keloids, which hold huge potential for enhancing aesthetic outcomes and preventing keloid recurrence.

KEYWORDS

case report, dermatologic surgery, keloid, superficial x-ray radiotherapy, surgical excision

1 | INTRODUCTION

Keloid is a form of pathological scar tissue that develops due to skin trauma or can even form spontaneously. It is characterized by lesions that grow beyond the boundaries of an original skin injury, continual expansion, a raised appearance, pain, itch, and firm and congested nodules resembling cords or flakes.¹ Skin color or ethnic of the patient is the main cause of the keloid, since genetics are a crucial risk for keloid development.² Most patients have a history of ear piercing and often experience pain or itching when it occurs on the ear. Meanwhile, keloid can seriously affect patients' appearance, psychology, and daily activities. Due to the challenges posed by the ear's skin flap, the lack of subcutaneous tissue, significant differences in individual anatomy, and the high aesthetic expectations, addressing ear keloid is a complex

task. Currently, the primary approach for treating complex keloids involves initial surgical removal followed by postoperative superficial x-ray radiotherapy (SXRT).³ We report on the case of a patient with treatment-resistant keloids of the preauricular and contralateral ear lobe, using surgery and SXRT. Remarkably, no recurrence was observed 2 years after the surgery (Figures 1C, 2C, and 3C). The experience of diagnosing and treating this case is detailed as follows.

2 | CASE HISTORY

A 33-year-old male patient with a 15-year history of keloid on the right earlobe and a 5-year history of keloid on the left anterior ear presented without symptoms other than pruritus. Despite undergoing two previous

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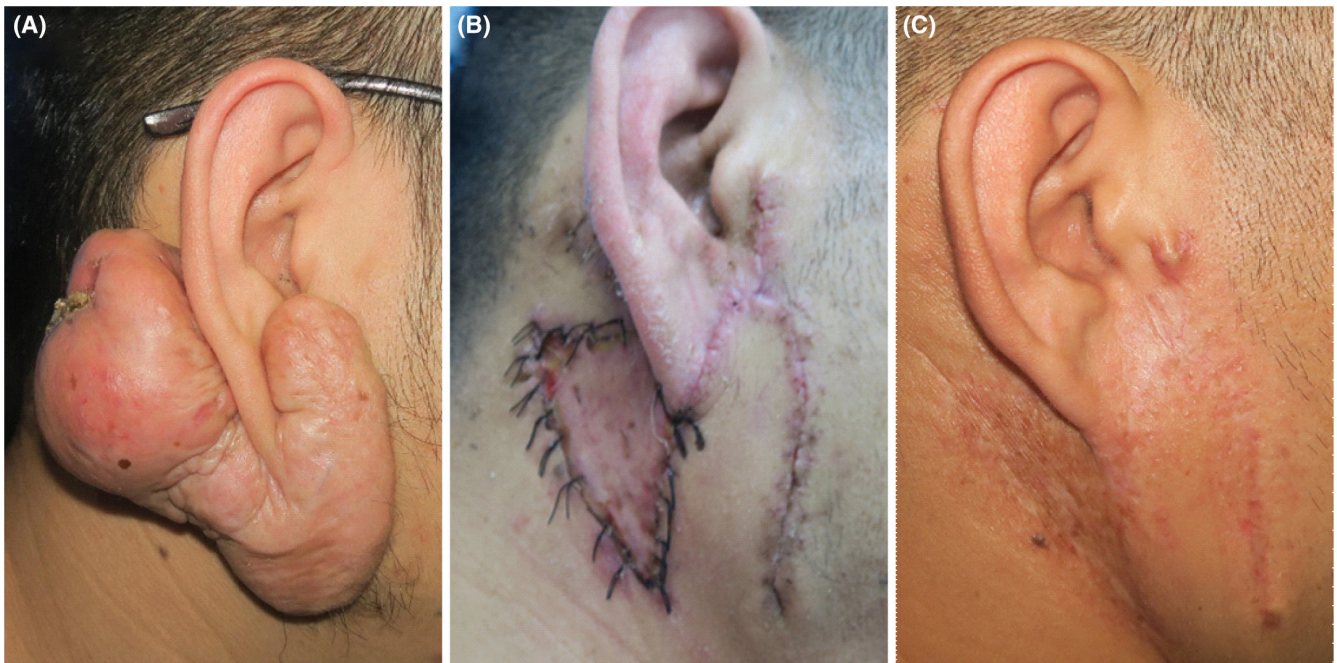


FIGURE 1 Pedicled flap behind the ear and superficial radiotherapy for the right preauricular skin defect after the keloid was removed. (A) The right earlobe before surgery. (B) The incisions on the right earlobe had healed well two weeks after surgery. (C) No keloid recurrence in the right earlobe two years after surgery.

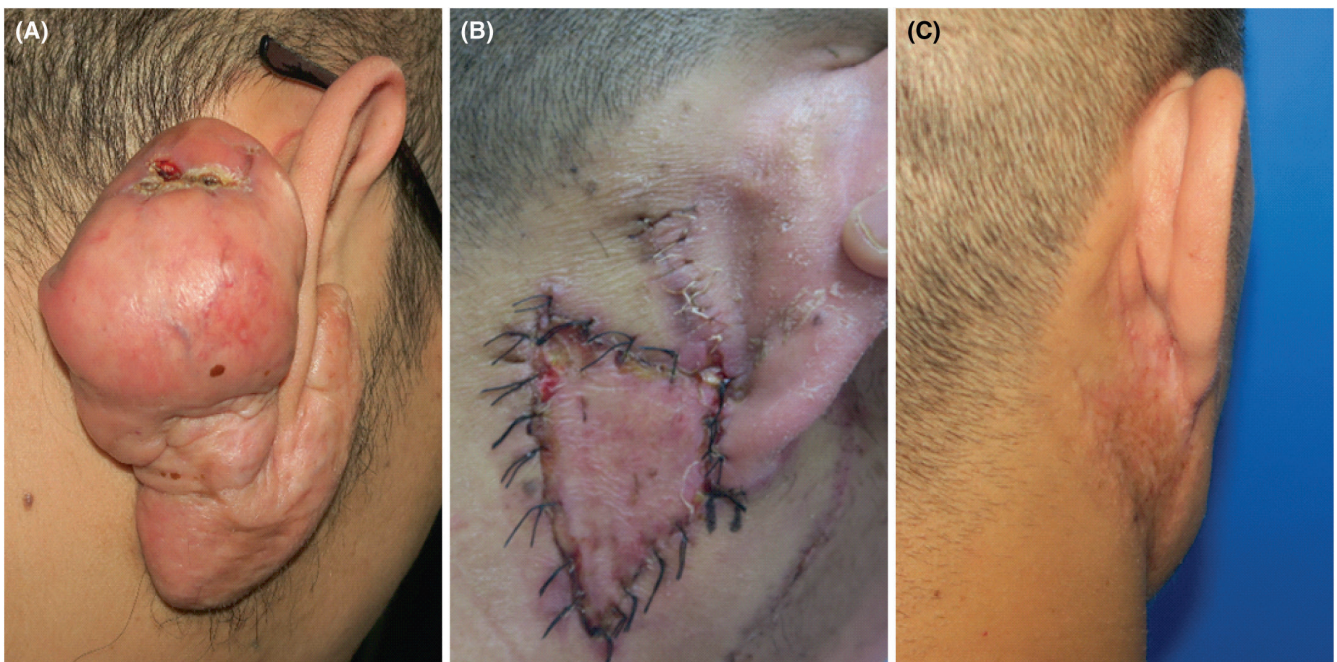


FIGURE 2 Free full-thickness skin graft and superficial radiotherapy for right retroauricular skin defect after the keloid was removed. (A) The right retroauricular keloid before surgery. (B) The skin graft behind the right ear had healed well two weeks after surgery. (C) No keloid recurrence on the right retroauricular area two years after surgery.

surgeries and one session of electron beam radiotherapy, the keloids had recurred. The keloid on the right side measured approximately 9.0 cm × 8.5 cm, with an irregular border, uneven surface, dark skin color, and hard texture, and was painless (Figures 1A and 2A). The

keloid on the left side measured about 4.0 cm × 3.0 cm, with a clear border, smooth surface, pink color, and tough texture (Figure 3A). The surrounding skin appeared normal, and no similar lesions were identified on other skin areas. A clinical diagnosis of keloid was

made, which was confirmed by pathological examination (Figure 4).

3 | METHODS

Prior to the surgical procedure, a thorough preoperative examination was conducted to exclude any relevant contraindications. After anesthesia induction, the lesion is completely excised along the outer edge of the keloid on the right earlobe. Special care was taken to restore the aesthetic form of the earlobe. Following the closure of the skin defect behind the ear in a linear fashion, a transposition flap was created by an auxiliary incision behind the ear.

The flap, supported by a rich blood supply, was rotated to the front of the ear to cover the corresponding skin defect. The flap was sutured in layers, which ensured no tension or displacement of the earlobe. The remaining skin defect behind the ear, was repaired using a free full-thickness skin graft from the left inner upper arm. The keloid on the left anterior ear was addressed by making an incision along its outer edge. Complete removal of the lesion was followed by thorough hemostasis, which was sutured in layers after separating subcutaneous fat at both ends.

SXRT (Sensus Healthcare, American, 100Kv) was employed for keloid treatment. The skin graft area behind the right ear received one fraction per week, each dose being 5 Gy, totaling a dose of 25 Gy. Other incisions (including

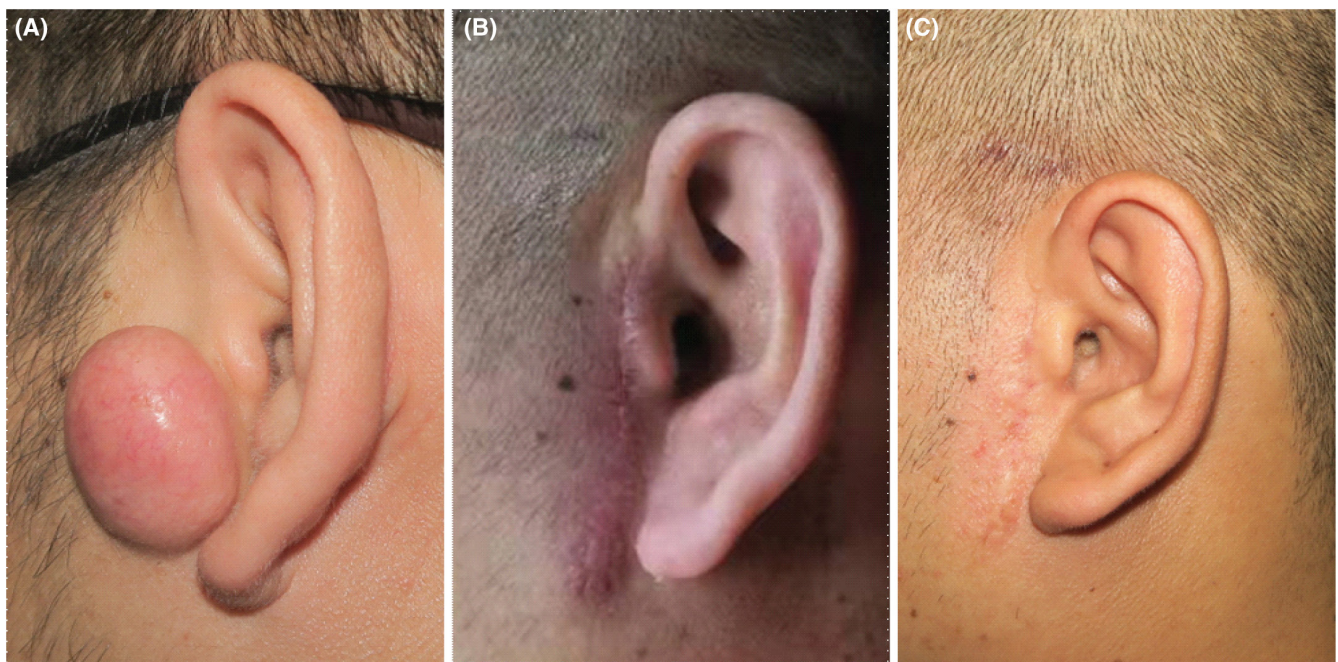


FIGURE 3 Surgery and superficial radiotherapy for the keloid on the left anterior ear. (A) The left preauricular keloid before surgery. (B) The incision on the left anterior ear had healed well two weeks after surgery. (C) No keloid recurrence on the left anterior ear two years after surgery.

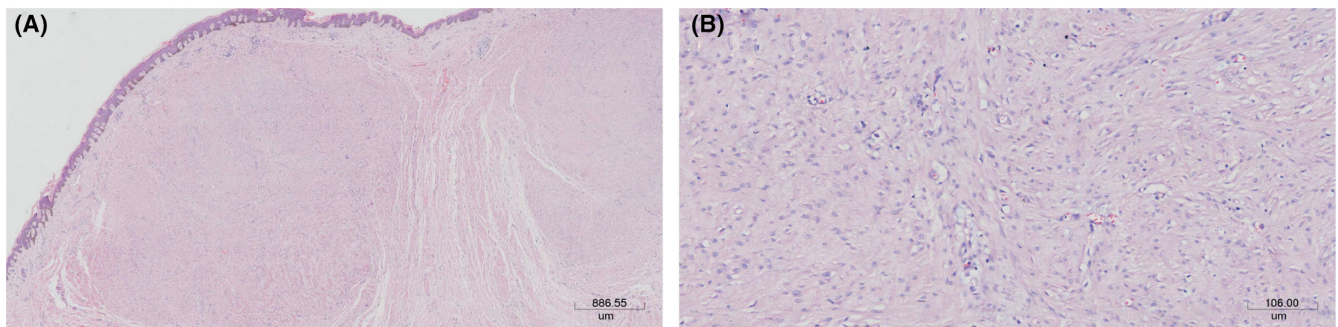


FIGURE 4 (A) The epidermis is generally normal. (B) Sparse infiltration of inflammatory cells around the superficial capillaries of the dermis, proliferation of fibroblasts and collagen in the upper and middle parts of the dermis, scattered proliferative capillaries, and sparse infiltration of inflammatory cells can be seen.

left preauricular and left inner upper arm area) were irradiated within 24 h after surgery at a dose of 5 Gy per day for three consecutive days, and the final irradiation session was conducted post-incision healing, totaling a dose of 20 Gy. The irradiation field included a sufficient 1 cm margin of normal skin surrounding the lesion.

4 | CONCLUSION AND RESULTS

Suture removal was performed 2 weeks after the procedure. The posterior skin of the right ear showed successful healing, the preauricular flap displayed good blood supply, and the earlobe's shape returned to its normal appearance. The incisions on the right earlobe and left preauricular area had healed well (Figures 1B, 2B, and 3B). Tailoring the surgical approach based on the size and extent of earlobe keloid is pivotal for preserving the earlobe's contour. Surgical excision is coupled with SXRT, which will significantly mitigate keloid recurrence.

5 | DISCUSSION

Keloid is generally considered a benign skin tumor characterized by an excessive proliferation of fibroblasts and an overabundance of collagen fibers. The degree of these pathological features varies significantly among individuals. Owing to its tendency for uncontrolled infiltration and growth beyond the boundaries of skin wounds, keloid is prone to recurrence and poses a formidable treatment challenge.⁴ Currently, the first-line therapy for keloids includes silicone gel or sheeting with corticosteroid injections. And the adjuvant treatment options include cryotherapy, lasers, photodynamic therapy, excision and radiation, pressure dressings, and others. Among them, surgical excision followed by radiation therapy has been showed to be highly effective at reducing recurrence rate of keloids, compared to other treatment methods.⁵

The earlobe constitutes a vital element of the overall external ear structure and is more prone to forming keloid. Hence, preserving the earlobe's favorable contour during aesthetic reconstruction after keloid removal is imperative. Additionally, to prevent excessive preauricular skin tension from distorting the earlobe's form, a transposition flap behind the ear was utilized to repair the preauricular skin defect in this case. Following the successful restoration of the earlobe's contour and the preauricular skin defect, the retroauricular skin defect, stemming from the flap rotation, was rectified by grafting a free full-thickness skin segment from the inner region of the left upper arm. This approach maximized aesthetic enhancement in the retroauricular region due to the similarity in skin texture

and minimal color discrepancy. Recent advancements in plastic surgery techniques have introduced various flap methods for earlobe reconstruction, including utilizing the side of the earlobe for rotational flaps,⁶ rectangular propulsive flaps,⁷ folding of the posterior ear flap,⁸ wedging excision and suturing⁹ and the V-Y propulsive flap.¹⁰ Each of these techniques strives to achieve the most optimal appearance of the earlobe.

SXRT has emerged as the frontline strategy for preventing postoperative keloid recurrence. Previous studies have revealed that the surgical excision alone is rarely curative with recurrence rates of ear keloids ranging between 45% and 100%.¹¹ However, contemporary evidence demonstrates that combining surgical resection with postoperative radiotherapy can effectively curtail the recurrence rate to approximately 14%.¹² These statistics may exhibit heterogeneity among different centers due to variations in radiation dosage, segmentation protocols, area dimensions, and treatment depth. Nevertheless, the optimal timing for irradiation after ear keloid surgery remains undecided. Most current research recommends initiating radiotherapy within 24 h after surgery, with an outer limit of 48 hours.¹³ Notably, in cases of giant keloid resection involving skin grafting, radiotherapy can be administered 1 day prior to surgery on the skin graft area, with a subsequent irradiation session performed 7 days after graft placement once the skin is viable.¹⁴ Meanwhile, we shielded the center of the skin graft during the last radiotherapy, which in order to reduce the recurrence rate of keloid on this area.

The efficacy of ear keloid treatment profoundly influences patients' psychological well-being and self-assurance. To further diminish the long-term recurrence rate of keloid and achieve optimal aesthetic outcomes, intraoperative meticulous suturing, comprehensive keloid tissue removal, postoperative radiotherapy (including intervention timing, frequency, and total dosage), and multi-center controlled clinical studies will constitute the forthcoming avenues of exploration.

AUTHOR CONTRIBUTIONS

Qin Tan: Writing – original draft; writing – review and editing. **Jinhui Xu:** Funding acquisition; writing – review and editing. **Wei Xu:** Validation; writing – review and editing. **Hao Lu:** Supervision; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare they have no competing interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The consent to participate is covered by the treatment contract signed at the hospital admission. Regarding local law, a separate ethics approval is not needed for this type of publication.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

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