

Post-otoplasty keloid scars – treatment strategies and case reports

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Summary

Keloids represent an abnormal scarring process characterized by excessive collagen proliferation beyond the original wound boundaries. Auricular keloids following otoplasty pose unique clinical challenges due to their high recurrence rate and aesthetic impact. This article reviews the pathophysiology and epidemiology of keloids, with a focus on those arising post-otoplasty. We present two case reports of patients with recurrent auricular keloids managed at our institution, highlighting our multimodal treatment approach. A structured treatment protocol combining silicone therapy, low-level laser therapy, pressure massage, and corticosteroid preparations is proposed, emphasizing early intervention to prevent keloid progression. Our experience underscores the importance of tailored prevention and treatment strategies to mitigate recurrence of keloid scars and improve outcomes.

Key words

keloid – scar – otoplasty – laser therapy – pressure therapy – silicone – corticosteroids

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Introduction

Wound healing is a complex physiological process culminating in scar formation, which restores tissue integrity but may lead to pathological outcomes such as hypertrophic scars or keloids. Keloids are benign fibroproliferative lesions characterized by excessive collagen deposition, extending beyond the original wound margins [1]. Unlike hypertrophic scars, keloids do not regress spontaneously and often enlarge over time, causing aesthetic, functional, and psychosocial issues [2]. Clinically, keloids present as firm, raised, glossy lesions, frequently accompanied by pruritus, pain, or pressure sensations [3].

Keloids have a reported prevalence of 4–16% in the general population, with higher rates (up to 20%) in individuals with darker skin phototypes (Fitzpatrick IV–VI), particularly those of African, Caribbean, South Asian, or Hispanic de-

scendent [4]. Genetic predisposition plays a significant role, with familial clustering suggesting autosomal dominant inheritance with incomplete penetrance [5]. Identified genetic markers, such as those on chromosomes 2q23 and 7p11, further support this predisposition [6]. Keloids are most common between ages 11 and 30, when skin healing is most active, with a slight female predominance [7].

Auricular keloids, particularly those following otoplasty, represent a distinct clinical subset due to their anatomical location and therapeutic challenges [8]. Otoplasty, a procedure to correct prominent ears, is often performed in younger patients, a group already at higher risk for keloid formation due to active wound healing. Auricular keloids in this region are particularly prone to recurrence due to mechanical tension and anatomical constraints. A study by Mohammadi et al. demon-

strated that surgical excision followed by postoperative intralesional triamcinolone acetonide injections achieved a 100% success rate without recurrence over a mean follow-up of 16 months, suggesting this combined approach as an effective treatment protocol for auricular keloids [9]. The posterior auricle, a common site for keloid development post-otoplasty, is poorly ventilated and subject to mechanical tension, exacerbating fibrotic responses [1]. Additional risk factors include darker skin phototypes, genetic predisposition, and a history of keloid formation [4]. These keloids frequently recur after treatment, necessitating repeated interventions and causing significant aesthetic and psychological distress [7]. While not separately classified in ICD-10 or ICD-11, auricular keloids require specialized management strategies to address their unique characteristics [8].

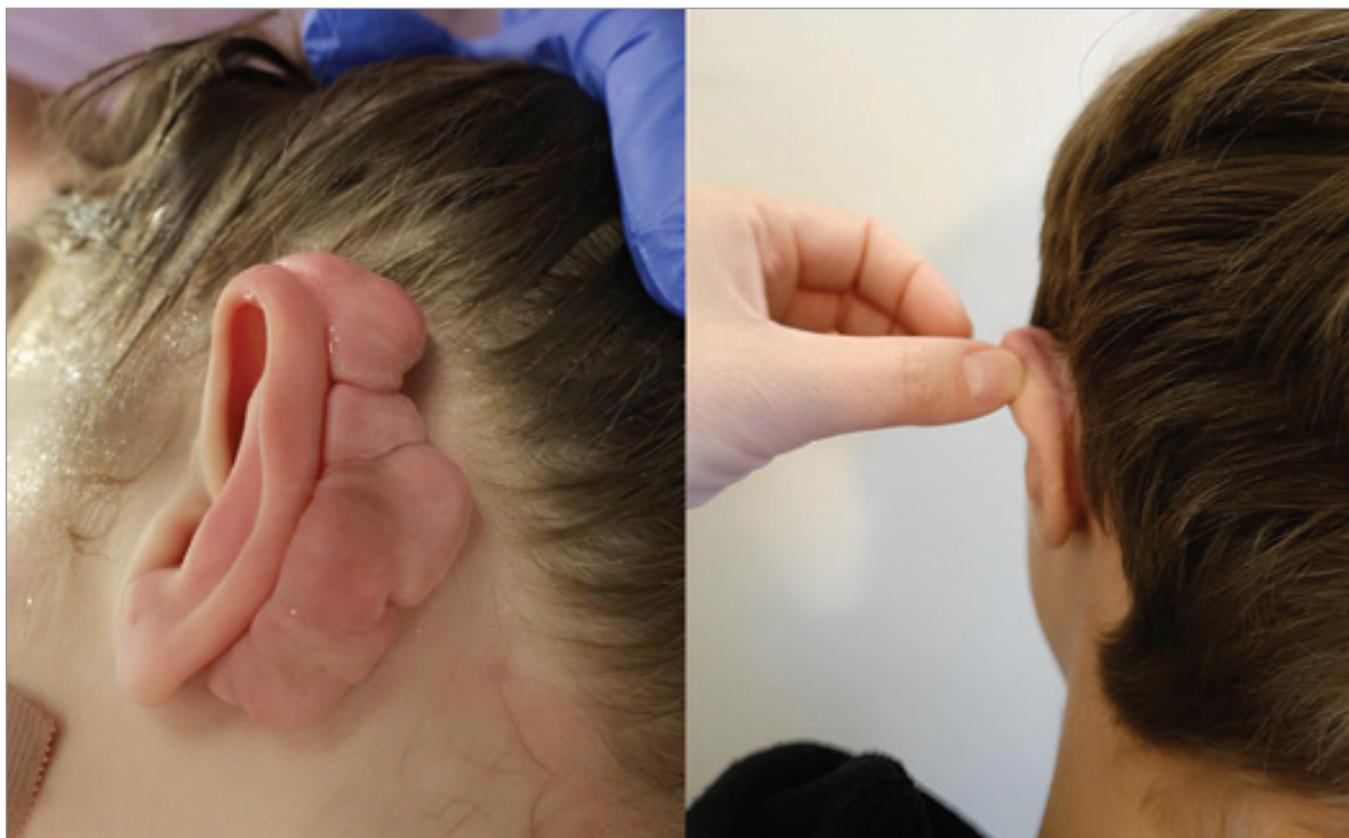


Fig. 1. Patient 1 – extensive keloid formation preoperatively (left) and a maturing scar one year post-surgery with strict adherence to the treatment protocol (right).

Case reports

Patient 1

A 14-year-old male patient, with a light skin phototype (Fitzpatrick II) and no family history of keloids, underwent bilateral otoplasty in 2017 at another institution to correct prominent ears. In 2019, he developed keloids on the posterior auricle, which were surgically excised. Recurrence occurred in 2022, likely due to non-compliance with the recommended postoperative treatment protocol after the initial excision and necessitated further surgical intervention. Postoperatively, our institutional protocol was implemented, consisting daily silicone gel and patch application, pressure massages, low-level laser therapy (LLLT) – 15–20 sessions, 3 times weekly) – and at the first signs of hypertrophic scar maturation, triamcinolone acetonide ointment was introduced (applied daily at night for one month, with ther-

apy repeated after a three-week interval). One year post-surgery, the patient exhibited improved scar remodeling with no further recurrence, although long-term monitoring remains ongoing (Fig. 1).

Patient 2

A 13-year-old male patient, with a light skin phototype (Fitzpatrick II) and no family history of keloids, underwent otoplasty in 2020 at another institution. Keloid formation was noted in 2022, leading to surgical excision. In 2024, recurrent keloids required another excision (Fig. 2), likely due to limited access to follow-up care and adjuvant therapies during the COVID-19 pandemic. Post-excision management followed our institutional protocol: daily application of silicone gel and patches, pressure massages, and LLLT – 15–20 sessions, three times weekly. At the first signs of hyper-

trophic scar maturation, triamcinolone acetonide ointment was introduced (applied nightly for 1 month). Three months after surgery, keloid scar maturation began to be observed; therefore, intralesional injections of methylprednisolone acetate were administered (every 3 weeks, for a total of 4 sessions). One year postoperatively, no signs of keloid recurrence were observed. The patient exhibited no scar hypertrophy and improved aesthetic outcomes, with ongoing follow-up to monitor for any recurrence (Fig. 3).

Discussion

The management of auricular keloids post-otoplasty remains challenging due to their high recurrence rate (up to 80% after surgical excision alone) and the aesthetic significance of the ear [1]. No universal treatment protocol exists, but evidence supports a multimodal approach



Fig. 2. Patient 2 – preoperative keloid formation observed on both ears.

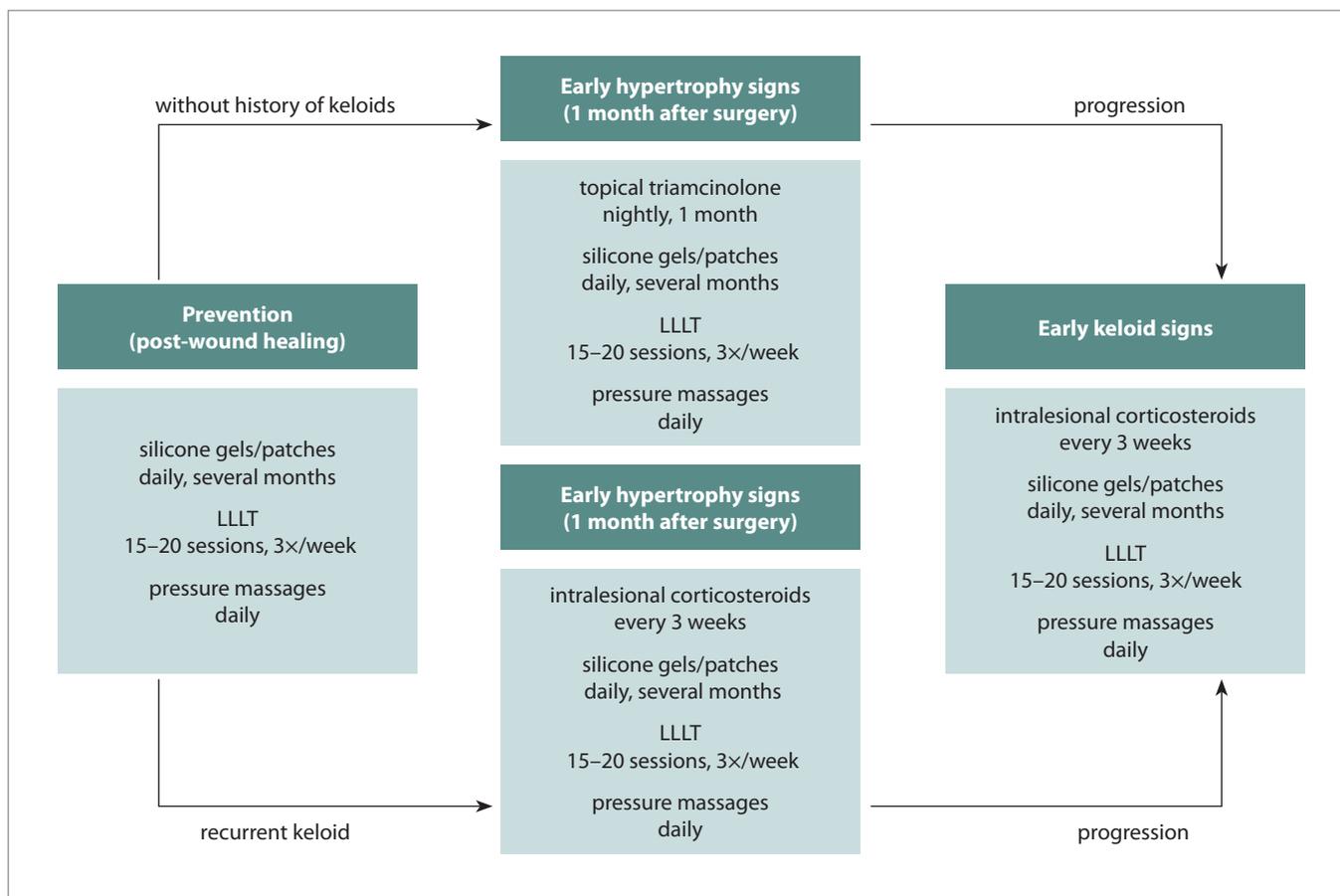


Fig. 3. Patient 2 –outcome of scar maturation one year following keloid excision with consistent adherence to the treatment protocol (repeated intralesional corticosteroid administration, low-level laser therapy, regular application of silicone products, and pressure massage).

combining surgical and non-surgical modalities to minimize recurrence and optimize outcomes [2]. Silicone-based therapy, LLLT and pressure massages are a cornerstone of prevention and therapy of hypertrophic and keloid scars [10,11]. Compression therapy, especially when combined with silicone sheets, has

also demonstrated reduced recurrence rates following keloid excision [12]. Silicone-based therapies (gels and patches) create a hydrated, occlusive environment that softens scars and reduces tension [10]. The LLLT (e.g., 805 nm LED devices used several times weekly) has shown promise in scar modulation, par-

ticularly in early hypertrophic and keloid scars, while pressure massages improve scar pliability [3,11]. At the first signs of scar hypertrophy or keloid formation, topical or intralesional corticosteroid administration such as methylprednisolone acetate plays an important therapeutic role by reducing collagen syn-



Scheme 1. Keloid scar treatment protocol at our institution.
 LLLT – low-level laser therapy

thesis and fibroblast proliferation [13]. The choice of steroid type, dosage, and injection technique remains variable in clinical practice, but international expert consensus highlights the need for standardized protocols for intralesional corticosteroid treatment of keloids [14]. The synergistic effect of triamcinolone acetonide and 5-fluorouracil in pathological scars is also well-documented, and physical enhancement techniques such as microneedling or microincision significantly improve their dermal penetration [15]. Advanced laser modalities, including pulsed dye laser (PDL) and fractional CO₂ laser, can improve texture, reduce erythema, and lead to partial volume reduction in keloid and hypertrophic scars. Clinical studies show that PDL in particular offers promising outcomes with minimal side effects. For established keloids, laser therapy (CO₂ or

PDL) is integrated with corticosteroids to enhance efficacy, with recent systematic reviews showing that CO₂ laser-assisted delivery of triamcinolone acetonide improves outcomes in scar texture, pigmentation, and volume reduction compared to monotherapy [16,17].

Adjunctive treatments such as radiotherapy and intralesional cytostatic agents have also been explored for keloid management. Postoperative superficial radiotherapy, particularly electron beam or brachytherapy, may reduce recurrence rates when administered within 24–72 hours after surgical excision, by suppressing fibroblast proliferation and extracellular matrix deposition. This approach is primarily used in adult patients and typically reserved for extensive or refractory keloid formations, given the potential risks and limited data on its safety and efficacy in pediatric

populations [18]. Similarly, intralesional 5-fluorouracil (5-FU), either alone or in combination with corticosteroids, has shown promising results in reducing keloid size and symptoms by interfering with DNA synthesis in rapidly dividing cells. This treatment is primarily used in adult patients, particularly for extensive hypertrophic or keloid scars, where conventional therapies have limited efficacy [19]. These modalities are generally reserved for refractory or recurrent cases due to potential side effects. Future research should focus on optimizing laser therapy parameters and exploring novel adjuvants, such as 5-fluorouracil, to further reduce recurrence rates [2]. Genetic profiling may also guide personalized prevention strategies, enhancing outcomes in predisposed individuals [6].

At our institution, we emphasize early intervention to prevent keloid progres-

sion, particularly in high-risk patients (e.g., younger age, darker phototypes, or positive family history) [4]. Our protocol, illustrated in Scheme 1 and implemented at our institution since 2022, is initiated immediately after wound healing and is tailored to the stage of keloid development. As part of the surgical protocol for the treatment of recurrent keloids, the authors recommend using only non-absorbable suture material, which is removed at the end of the second postoperative week. A key element of the surgical technique is the careful mobilization of the wound edges to achieve a tension-free closure, thereby minimizing mechanical stress on the scar and reducing the risk of recurrence. According to the authors' clinical experience, early initiation of the protocol using LLLT and topical corticosteroid ointments at the first signs of hypertrophic scar formation in at-risk teenage patients helps reduce the progression to potential keloid development. In contrast, in patients with a known history of keloids in this high-risk age group, it is advisable to initiate intralesional corticosteroid injections at the earliest signs of hypertrophic scarring. None of the presented patients experienced any side effects related to the non-systemic administration of corticosteroids.

This approach has shown promising results in reducing recurrence and improving aesthetic outcomes, as demonstrated in the presented cases. The presented cases highlight the efficacy of a structured, multimodal approach in managing auricular keloids post-otoplasty. Early intervention, particularly in high-risk patients, is critical to prevent progression to fully developed keloids [4].

Conclusion

Although rare, keloid formation following otoplasty must be considered a potential complication, particularly in predisposed individuals. Early recognition and intervention are essential, with treatment ideally initiated during the early stages of scar maturation. In

cases where the keloid causes auricular deformity, surgical excision is indicated. However, surgical excision alone carries a high risk of recurrence. Based on our clinical experience, the implementation of a strict multimodal postoperative protocol including silicone therapy, pressure massage, low-level laser therapy, and topical or intralesional corticosteroids significantly reduces the likelihood of recurrence and improves both functional and aesthetic outcomes.

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