

Case Report**Intralesional excision as a management strategy for keloids**

Trimartani*, Dini Widiarni Widodo*, Respati Wulansari Ranakusuma,
Mesiwisani*, Annisa Putri*, Mirta Hedyati Reksodiputro***

*Department of Otorhinolaryngology Head and Neck Surgery

Dr. Cipto Mangunkusumo Hospital, Jakarta/Faculty of Medicine Universitas Indonesia,

**Clinical Epidemiology and Evidence-Based Medicine Unit

Dr. Cipto Mangunkusumo Hospital, Jakarta/Faculty of Medicine Universitas Indonesia

ABSTRACT

Background: Several therapeutic modalities exist for keloids, but management them remains a challenge due to high recurrence rates. These case series discussed surgical therapy using intralesional excision. **Purpose:** To compare the effect of intralesional excision with extra-lesional excision followed by post-operative triamcinolone injection, on the recurrence rates of auricular keloids. **Case reports:** Three patients with keloids treated with intralesional excision were presented. The first patient, a 20-year-old male, had keloids on both ears, nose, hands, and feet following burnt injury. The second patient, a 19-year-old female, had a keloid lump on the left auricle. The patient had a history of bilateral microtia and had undergone stage 1 auriculoplasty with rib grafting on both ears. The third patient, a 36-year-old woman with complaints of a keloid appearing for 3 years in the helix of her right ear, and underwent surgical excision followed by triamcinolone injection. **Clinical question:** How does the recurrence in patients with auricular keloid undergoing intralesional excision and postoperative triamcinolone injection, compared to extra-lesional excision and triamcinolone injection? **Method:** A systematic literature search was conducted using PubMed, Cochrane Library, Scopus, and ClinicalKey with relevant keywords: “intralesional excision”, AND “keloid”. **Result:** A total of 192 articles were found, and 3 articles met the eligibility criteria. **Conclusion:** The literature search revealed no difference in the recurrence rates between intralesional and extra-lesional excision with triamcinolone injection. Further research on this topic is needed.

Keywords: intralesional excision, keloid, recurrence

ABSTRAK

Latar belakang: Terdapat beberapa modalitas terapi untuk keloid, namun penatalaksanaan keloid masih menjadi sebuah tantangan tersendiri karena tingginya angka rekurensi. Laporan kasus ini membahas mengenai terapi pembedahan dengan teknik eksisi intralesi. **Tujuan:** Mengetahui rekurensi pasien dengan keloid aurikula yang dilakukan eksisi intralesi dengan injeksi triamcinolone pasca operasi, dibandingkan dengan eksisi ekstraslesi dengan injeksi triamcinolone. **Laporan kasus:** Dipaparkan tiga kasus keloid yang dilakukan eksisi intralesi pada tiga orang pasien. Pasien pertama, laki-laki, 20 tahun terdapat keloid pada kedua telinga, hidung, tangan dan kaki pasca mengalami luka bakar. Pasien kedua, seorang perempuan, 19 tahun terdapat benjolan pada sisi belakang daun telinga kiri. Pasien dengan riwayat mikrotia bilateral dan dilakukan aurikuloplasti tahap 1 dengan menggunakan tandur iga pada kedua telinga. Pasien ketiga, seorang wanita berusia 36 tahun mengeluhkan benjolan yang muncul pada heliks telinga kanan selama tiga tahun, dan menjalani eksisi yang diikuti injeksi triamcinolone. **Pertanyaan klinis:** Bagaimana rekurensi pasien dengan keloid aurikula yang telah dilakukan eksisi intralesi dan injeksi triamcinolone dibandingkan dengan yang dilakukan eksisi ekstraslesi dan injeksi triamcinolone? **Metode:** Pencarian literatur dilakukan secara sistematis melalui PubMed, Scopus, ClinicalKey, Cochrane dengan menggunakan kata kunci: “intralesional excision”, DAN “keloid”. **Hasil:** Diperoleh 192 artikel, dan didapatkan 3 artikel yang sesuai dengan kriteria eligibilitas. **Kesimpulan:** Dari hasil pencarian literatur, tidak ada perbedaan

angka rekurensi eksisi intralesi dibandingkan eksisi ekstraslesi disertai injeksi triamcinolone. Namun perlu dilakukan penelitian lebih lanjut mengenai hal ini.

Kata kunci: *eksisi intralesi, keloid, rekurensi*

Correspondence address: Trimartani, MD. Department of Otorhinolaryngology Head and Neck Surgery (ORL-HNS), Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia. Email: trimartani111@gmail.com.

INTRODUCTION

Keloid is a pathological response to skin trauma, characterized by excessive tissue growth beyond the lesion area.¹ Keloids typically appear 3-9 months after trauma and can continue to grow for years.² The term “keloid” comes from the Greek word “chele,” meaning crab’s claw, due to its crab-like appearance as it extends into the surrounding healthy tissue.³

Keloids can occur anywhere on the body but are more common on the earlobes, pre-sternal region, deltoid, and below the umbilicus (pubic area).⁴ The most common cause of keloids on the ears is piercing. Unlike typical scars, keloids are prominent, extending beyond the original scar boundaries, and causing cosmetic concerns.⁵ Keloids form due to abnormalities in the wound healing process. Hyperactivity of fibroblasts persists, accompanied by decreased collagenase activity, leading to excessive collagen production and keloid formation.⁶

Currently, there are several therapeutic modalities for keloids. Surgery, intralesional injections, cryotherapy, compression therapy, silicone gel sheets, or a combination of various techniques have been recommended for keloid management. Surgical therapy is considered the best option for keloids on the ears.⁷

The etiology and pathogenesis of keloids are not yet fully understood. Various theories have been proposed, including genetics, proliferation ability of extracellular

matrix-forming cells, inflammation, hypoxia, and mechanical stress.⁸ The wound healing process consists of four phases: hemostasis, inflammation, proliferation, and remodeling. The initial phase involves recruiting inflammatory cells, fibroblasts, and epithelial cells to form a matrix in the wound area, contributing to scar formation. Fibroblasts and myofibroblasts synthesize collagen, forming the extracellular matrix. The balance between collagen production and extracellular matrix degradation affects scar formation.

Histologically, keloids consist of irregular hyaline collagen clusters with an increased ratio of collagen types I and III, increased extracellular matrix myxoid, increased dermal cells with numerous fibroblasts at pathological density, but few inflammatory cells in the stromal area.² Patients with keloids often complain of itching, pain, and cosmetic discomfort.⁹ Keloid is classified as: (1) fresh nodular keloids (still growing) which are recommended for excision with radiation or intralesional triamcinolone injection as additional post-operative therapy, (2) keloids with superficial spread (butterfly keloids) are treated with triamcinolone injections limited to the growing area, (3) mature keloids (no longer growing) are managed with surgery, triamcinolone injections, and carry no recurrence risk, (4) transitional keloids, unable to be classified directly, encompass several keloid types.

Management standards for keloids vary by country. In Japan, the main therapy is steroid-impregnated tape, while in the USA, the primary therapy is intralesional steroid

injections with triamcinolone acetonide (TCA). Medication therapies include TCA injection, a combination of TCA with 5-fluorouracil, mitomycin C, bleomycin, imiquimod, botulinum, interferons, onion extract, laser-based devices, and laser combined with TAC.¹ Surgical therapies for keloids include intralesional and extra-lesional excision. Some literatures suggest that extra-lesional keloid excision is associated with a high recurrence rate of 80-100%, but the addition of post-operative radiotherapy can significantly reduce recurrence by 2-33%. Intralesional (intramarginal) keloid excision is defined as a partial excision technique, removing tissue inside the keloid boundary, and closing the wound with the remaining keloid edge.¹⁰

Some reasons supporting intralesional excision include avoiding incisions in the surrounding area of the keloid. The higher recurrence rate in extra-lesional keloid excision without additional therapy, indicates that trauma can induce injury to the skin area directly adjacent to the keloid. Another reason is to prevent trauma to the inner dermis of the keloid. Intralesional excision also removes the majority of proliferating fibroblasts within the keloid. Fibroblasts in the central part of the keloid have lower apoptosis activity compared to the superficial and deep areas. Therefore, removing the central part of the keloid can reduce recurrence rates.¹¹ Another theory suggests that intralesional excision also functions as mechanical debulking. The keloid tissue edge left after intralesional incision can function to withstand tension on the keloid tissue edge. Tissue tension can cause excessive collagen formation and initiate keloid formation again.¹⁰ Extra-lesional excision, also known as complete excision, is another surgical technique that can be used for keloid management. In this technique, the entire keloid is removed, resulting in a wider scar.¹¹

These case series discussed surgical therapy using intralesional excision. Compared

to single surgery or radiotherapy management without combination surgery followed by radiotherapy showed excellent efficacy, with only a 20% recurrence rate. Radiation is often indicated for keloid patients or those with a high recurrence risk, including marginal resection, extensive surgical operations, and unusual locations. Management is more effective when radiotherapy is promptly administered on the same day as surgery. Radiotherapy is indicated for scars with a radial border of more than 1 cm and a depth of 0.5-1 cm.¹² There is also a new therapy for keloid management involving the use of verapamil, ultraviolet A1, and Angiotensin-converting enzyme inhibitor (ACEI).³

CASE SERIES

CASE 1

A 20-year-old male presented with complaints of keloids on both ears, nose, hands, and feet following a burn injury. The patient initially suffered a burn injury due to a liquefied petroleum gas explosion, resulting in a 60% burn. He was subsequently taken to a hospital and received wound care with bandaging. Six months after wound care, keloids developed on both ears, nose, hands, and feet. The patient sought treatment at the Plastic and Reconstruction Clinic at Otorhinolaryngology-Head and Neck Surgery (ORL-HNS) Department, Cipto Mangunkusumo General Hospital.



Figure 1. Keloid in ascending helix, antihelix, and lobules

Physical examination of the left auricular ascending helix revealed three keloids. The first keloid measured approximately 4 cm x 1 cm x 0.5 cm. The second keloid on the antihelix measured around 1.5 cm x 0.3 mm x 0.1 mm. The third keloid on the lobule measured 4 cm x 1 cm x 1 cm. These keloids were brownish, well-defined, oval-shaped, had a smooth surface, regular edges, were fixed, and palpation revealed a hard consistency (Figure 1). The patient then underwent intralesional keloid excision under general anesthesia in the operating room. Following the surgical therapy, additional post-operative treatment TCA injection was administered.



Figure 2. One week post operation



Figure 3. (a) Three months post operation, (b) Six months post operation

Then three months after, the same procedure was performed on the keloid tissue of the right ear of the patient. Upon physical examination, keloid tissue was found in almost the entire part of the right auricle, including the ascending helix, the posterior part of the superior helix, descending helix, and antihelix, with the largest part measuring

approximately 8 cm x 4 cm x 1 cm. It was brownish, well-demarcated, had a smooth surface, regular edges, fixed, and upon palpation, it exhibited a firm consistency.

CASE 2

A 19-year-old female, presented with a complaint of a lump on the back side of her left auricle, for the past 4 years. The lump was gradually getting larger. She had a history of bilateral microtia and had undergone stage 1 auriculoplasty with rib cartilage grafting on both ears in 2014. Postoperatively, she got an infection in the left ear, leading to a corrective surgery.

On physical examination, a keloid was found on the superior helix framework of the left auricle, measuring about 3 cm x 1 cm x 1 cm, with well-defined borders, a smooth surface, a firm palpable texture, and no tenderness while pressured.



Figure 4. Keloids affected almost all parts of right auricle



Figure 5. (a) One week post operation, (b) Three months post operation



Figure 6. Keloid at the framework of superior helix of the right auricle

Afterwards she underwent intralesional keloid excision under general anesthesia in the operating room. She got additional postoperative treatment TCA injection once a week.



Figure 7. One week post operation



Figure 8. One month post operation

CASE 3

A 36-year-old woman came to the Plastic and Reconstruction Clinic at ORL-HNS Department, Cipto Mangunkusumo General Hospital, with complaints of a lump appearing in the helix of her right ear for 3 years, which she felt was getting bigger. The complaint initially arose due to trauma when the patient’s child pulled the patient’s earring. The family history of keloid was denied. Upon examination, it was found that on posterior helix of the right auricle, there was

a mass measuring 7 cm x 3 cm x 2 cm. It was solid, with firm boundaries, smooth surface, and no open wounds were visible. (Figure 9). The patient was diagnosed with auricular dextra keloids. Under general anesthesia, surgical excision of the right auricular keloid tissue was performed. (Figure 10). In post-operative care, patients received analgesic and antibiotic therapy. Injectable TCA was given weekly, starting from the second week of control. Concurrently, the result of TCA therapy was also monitored.



Figure 9. Keloid on the helix of the right ear



Figure 10. Keloid tissue



Figure 11. Nine weeks after keloid excision and TCA injection

CLINICAL QUESTION

Based on the cases above, the clinical question formulated was, “How does the recurrence in patients with auricular keloids undergoing intralesional excision and post-operative TCA injection compared to extra-lesional excision and TCA injection?” From this clinical question, the PICO (Patient/population/problem, intervention, comparison, outcome) was as follows:

- P : Patients >18 years old with auricular keloids
- I : Intralesional excision of keloids and triamcinolone injection,
- C : Extra-lesional excision of keloids and TCA injection,
- O : Post surgical recurrence.

METHOD

A systematic literature search was conducted through PubMed, Cochrane Library, Scopus, and ClinicalKey using keywords as presented in Table 1. Hand searching was performed by identifying literatures based on studies that aligned with the PICO criteria. The search results were filtered based on inclusion and exclusion criteria. The inclusion criteria were: 1) Systematic review/meta-analysis of randomized controlled trials (RCTs) and non-randomised of intervention studies (Non RCTs), and 2) RCT and nonRCT.

The exclusion criteria were: 1) Non-comparative studies, case reports, or case series; and 2) Journals in languages other than English and Indonesian.

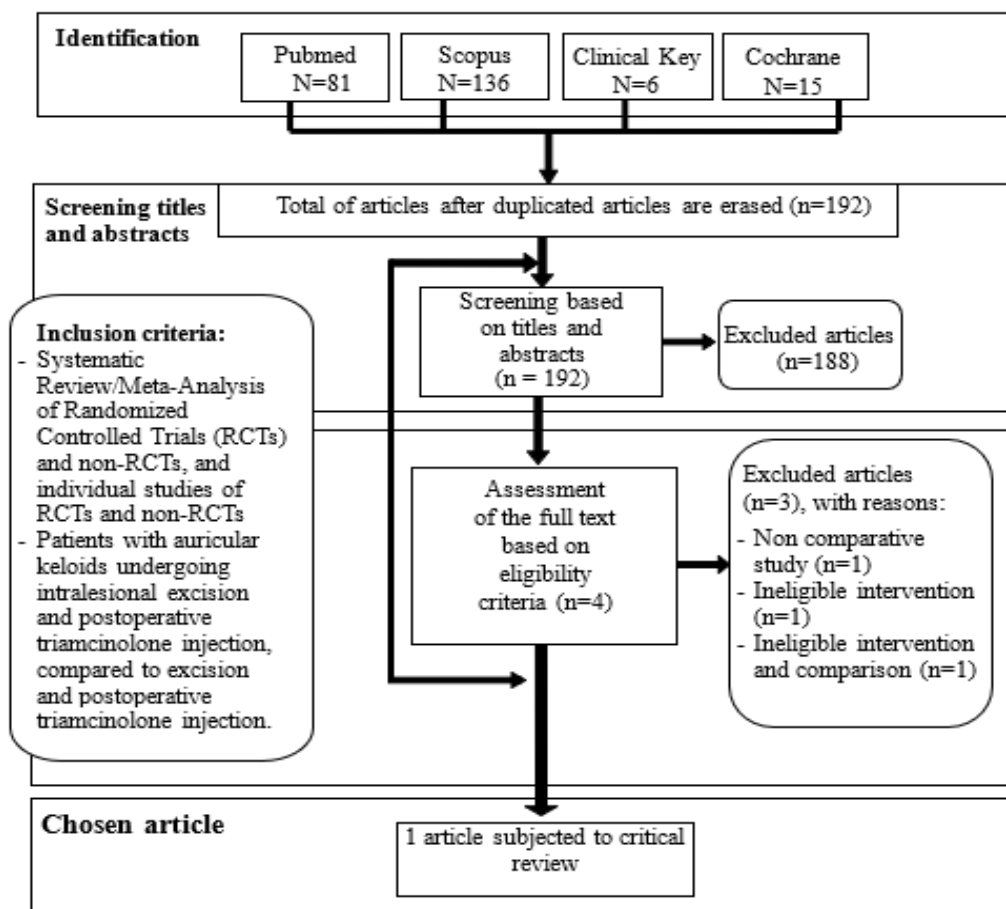


Figure 12. Flowchart of literature search

Table 1. Literature Search Results

Article	Year	Country	Study design	Population	Age	Patient number	Duration of Follow Up	Intervention	Comparison	Outcome
Mohammadi, et al.	2019	Iran	Retrospective cohort	Female patients with keloids after ear piercing underwent surgical excision followed by triamcinolone injection.	16-40	31 keloid out of 21 patients	10-29 months	Intralesional excision of keloids + postoperative triamcinolone injection (n=22)	Excision of keloids + postoperative triamcinolone injection (n=9)	No recurrence in both intervention and comparison groups at 10-29 months postoperatively.

Table 2. Critical appraisal using ROBINS-I

Research		Pre-intervention		During intervention	Post-intervention			Overall bias	
First author	Year	Bias due to confounding	Bias in selection	Bias in classification of intervention	Bias due to deviations	Bias due to missing data	Bias in measurement	Bias in selection	
Mohammadi, et al	2019	Critical risk of bias	Serious risk of bias	Critical	Moderate	Low	Serious risk	Moderate risk of bias	Critical risk of bias

Studies meeting the eligibility criteria underwent a critical appraisal process using the qFAITH critical appraisal tool for systematic reviews or meta-analyses; and the appraisal tools from the Oxford Centre for Evidence-Based Medicine (OCEBM) for RCTs and ROBINS-I for non-RCTs. Included studies were then assessed for the level of evidence using the OCEBM's level of evidence criteria (Table 2).

RESULT

From the literature search, 192 articles were found from four databases. However, only one article met the clinical question and eligibility criteria, as shown in Figure 12. A summary of the selected articles and the result of the critical appraisal were presented in Tables 1 and 2.

From the critical appraisal using ROBINS-I, a critical risk of bias was identified due to confounding variables. The

Kyoto Scar Scale was used in this study to assess the bias subjectively and objectively. The subjective assessment had the potential for confounding bias. Serious risk was found in the selection bias. In this study, sample selection was done after the intervention, where if it was estimated that there was no tension during the closure process in keloid excision, the authors would perform the extralesional excision. If tension was expected, intralesional excision would be performed. The intervention performed in the sample group was not clearly explained in this study. Information or data to determine the intervention group was also not described. This made the bias assessment in terms of intervention classification to critical risk.

The overall bias assessment for this study was a critical risk because the critical risk result was found in one component of the bias assessment, namely bias due to confounding. The level of evidence in this study was 4.

DISCUSSION

These case series discussed the management of keloids on the ear using the intralesional excision technique. There are several intralesional excision techniques for keloids. According to Straatsma et al. quoted Goutos,¹⁰ excision was performed in the central part of the keloid, leaving about 3 mm from the outermost edge of the keloid tissue. Kitlowski et al. quoted Goutos,¹⁰ recommended an incision leaving a sufficient peripheral margin for wound closure without the need to suture the normal skin. Meanwhile, Peracok et al. quoted Goutos,¹⁰ suggested an intralesional excision technique by leaving a small portion (<1 mm) from the edge of the keloid border towards the inside without reaching the subcutaneous fat. In a study by Mohammadi et al.¹³, intralesional excision was performed on 22 (71%) keloids, and 9 (29%) underwent extra-lesional excision. Intralesional corticosteroid injections were administered three to six times. From the follow-up results conducted for 10-29 months, no recurrence was observed in the post-operative area. This indicated no difference between extra-lesional excision and intralesional excision.

A study in North America in 1967 presented intralesional excision as a management for recurrent keloids on the ear, using intralesional steroids as additional therapy. In this study, no recurrence of keloids on the ear was observed during the nine-month follow-up period.¹⁰

In the management of keloids, monotherapy with surgery alone was rarely used due to a relatively high recurrence rate of around 50-100%. Therefore, additional therapies such as intralesional corticosteroid injections, interferon injections, or radiotherapy were often employed in combination with surgical therapy.⁵

In these three reported cases, triamcinolone acetonide (TCA) injections

were chosen as an additional post-operative therapy. In a study by Mohammadi et al.¹³, it was mentioned that TCA, a corticosteroid, plays a role in suppressing the inflammatory process in wounds, inhibiting the growth of fibroblasts and $\alpha 2$ -macroglobulin, which affects the increased degradation of collagen and inhibits glycosaminoglycan synthesis. Additionally, TCA injection could inhibit Vascular Endothelial Growth Factor (VEGF) and Transforming Growth Factor (TGF)- $\beta 1$, and induce regression of scar tissue. Intralesional TCA injections had been proven to be effective in reducing keloids by approximately 50-100%. Post-operative TCA injections were also effective in preventing recurrence.

In conclusion, the recurrence of keloids after intralesional excision and TCA injection was relatively low. From the literature search results, there was no significant difference in the recurrence rates between intralesional excision and extra-lesional excision combined with TCA injection. However, we had only observed three cases of intralesional excision combined with TCA injection. Therefore, further research on this topic is needed.

REFERENCE

1. Limmer EE, Glass DA. A Review of Current Keloid Management: Mainstay Monotherapies and Emerging Approaches. *Dermatol Ther (Heidelb)*. 2020;10(5):931–48.
2. Lemperle G, Schierle J, Kitoga KE, Kassem-Trautmann K, Sachs C, Dimmler A. Keloids: Which Types Can Be Excised without Risk of Recurrence? A New Clinic Classification. *Plast Reconstr Surg - Glob Open*. 2020;8(3):e2582.
3. Ekstein SF, Wyles S, Moran S, Clinic M, Clinic M, Clinic M, et al. Keloids: A Review of Therapeutic Management. *Int J Dermatol*. 2021;60(6):661–71.
4. Alrasheed ABCDEF MA, Alhaddad ADEF MS, Almuhaini ADEF NA, Almohammedi. Corresponding Author AA, Alrasheed MA.

- An Unusual Maxillary Sinus Foreign Body: A Case Report. *Am J Case Rep.* 2021; 22: e928534-1–e928534-9.
5. Yun YC, Lee H. Auricular keloid management in Asian skin : Clinical outcome of intralesional excision and postoperative triamcinolone acetonide intralesional injection. *J Cosmet Dermatol.* 2020 Nov; 19(11):3041-7.
 6. Vanhouteghem O. Remarkable efficiency of surgical shave excision of keloids followed by intralesional injection of Bleomycin. A retrospective study of 314 cases. *Dermatol Ther.* 2022;35(5):6–10.
 7. Madura C, Nayak PB, Raj PR, Chandrashekar BS. Surgical approach in the management of ear keloids: our experience with 30 patients. *Int J Dermatol.* 2021;60(12):1553–60.
 8. Nanggole FW, Agak GW. Keloid pathophysiology: fibroblast or inflammatory disorders? *Pathophysiology of Keloids. JPRAS Open.* 2019;22:44–54.
 9. Zhang YG, Cen Y, Liu XX, Yu R, Xu XW. Clinical improvement in the therapy of aural keloids. *Chin Med J (Engl).* 2009;122(23):2865–8.
 10. Goutos I. Intralesional excision as a surgical strategy to manage keloid scars: what's the evidence? *Scars Burn Heal.* 2019 Jan-Dec; 5: 2059513119867297.
 11. Tran JV, Lultschik SD, Ho JS, Sapra S, Dong K, Gusic K. Concomitant therapy of surgical shave excision and intralesional injections for ear keloids: Early results from a retrospective cohort study. *Scars Burn Heal.* 2022 Jan-Dec;8: 20595131221098531.
 12. Zainib M, Amin NP. Radiation Therapy In The Treatment Of Keloids. *StatPearls.* 2022 Aug 1.
 13. Mohammadi AA, Kardeh S, Motazedian GR, Soheil S. Management of Ear Keloids Using Surgical Excision Combined with Postoperative Steroid Injections. *World J Plast Surg.* 2019;8(3):338– 44.