

# Surgical excision and cryosurgery in the treatment of recurrent auricular keloids

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## Abstract

**Introduction:** Keloids result from an abnormal fibrous wound healing process. Effective treatment of keloids still present a significant challenge. Various modalities of therapy may be applied, but none of them has been proved entirely successful.

**Aim:** To evaluate the effectiveness of cryosurgery as a preventive approach after surgical excision of the recurrent auricular keloids.

**Material and methods:** Eight patients treated for recurrent auricular keloid were included in the study. The recurrence followed surgical excisions without any complementary therapy. The keloids were excised under local anaesthesia within healthy tissue borders. Cryosurgery was applied on the seventh or tenth day following the excision, after the removal of sutures.

**Results:** Accepting the lack of recurrence after the treatment as the main criterion, good results were obtained in 7 out of 8 treated patients, which was 87.5% of the study group.

**Conclusions:** Cryosurgery is a very effective approach preventing keloid recurrence after surgical excision; this finding is supported by 87.5% of good results in the treatment of recurrent changes. The effectiveness of this method may result from the specific location of the changes and a relatively small surface of tissue subjected to freezing, which enables complete damage of keloids and formation of atrophic scars on these areas.

**Key words:** recurrent keloid, cryosurgery.

## Introduction

The final process of wound healing involves scar formation. In most individuals the course of this process is normal and the resultant scars are linear or atrophic. However, in some patients, hypertrophic scars and keloids are formed for no obvious reason. They are formed due to imbalance between collagen synthesis and degradation leading to excessive collagen production [1, 2]. The basic feature which differentiates keloids from hypertrophic scars is the ability of expansion beyond the boundaries of the initial lesions, lack of involution symptoms and tendency to recur after surgical excision. Keloids may form regardless of the patient's age, however, they are more frequent in children and young individuals. The body areas which are most prone to keloid formation include the chest, shoulders, nuchal region and ear pinnae. Auricular keloids may cause pain, itching or burning sensations, but first of all, they present an aesthetic problem [3].

The treatment of ear keloids is still a serious challenge. So far, there has been no generally accepted procedure algorithm to deal with this problem effectively. Regardless of the applied therapy, the condition is recurrent, which makes the treatment even more difficult [4].

## Aim

The goal of the paper is to evaluate the effectiveness of cryosurgery as a preventive approach after surgical excision of the recurrent auricular keloids.

## Material and methods

Eight patients treated for recurrent auricular keloids were included in the study. The recurrence followed surgical excisions without any complementary therapy. The keloids had been excised twice in two patients and thrice in one female patient prior to the study. The patients' age

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range was 12-59 years. In 6 patients, the keloids were located on earlobes and in the two remaining cases – on the anterior and rear surface of the ear. The primary keloids were formed due to earlobe piercing ( $n = 5$ ), tear by the earring ( $n = 1$ ), surgical procedure ( $n = 1$ ) and trauma ( $n = 1$ ). Three patients were previously treated with Polcortolon or Depo-Medrol injections, which resulted in a slight decrease in the keloid mass. The period of patients' observation was from 1 to 10 years.

Due to the large volume of the treated keloids, cryotherapy was not directly applied to the pathologic lesions. In the first stage, keloids were excised under local anaesthesia within healthy tissue borders; in some patients the fragments of skin covering the keloid were left, which enabled closing the wound without tension. Cryosurgery was applied on the seventh or tenth day following the excision, after the removal of sutures. The cryosurgical procedure was repeated 3 or 4 times every 6 weeks. For this purpose, the KRIOPAN apparatus with liquid nitrogen was used. The treated areas were cooled using proper applicators. Spray treatment was not applied. The time of exposure was from 30 s to 45 s. Each procedure involved double scar freezing with a 1-2 min interval to thaw the treated spot. The procedure was repeated, since such an approach has been proven to enhance the cryogenic effect. Antibiotic ointment was applied to the treated area. The healing process lasted for 10 to 12 days; no complications were observed.

## Results

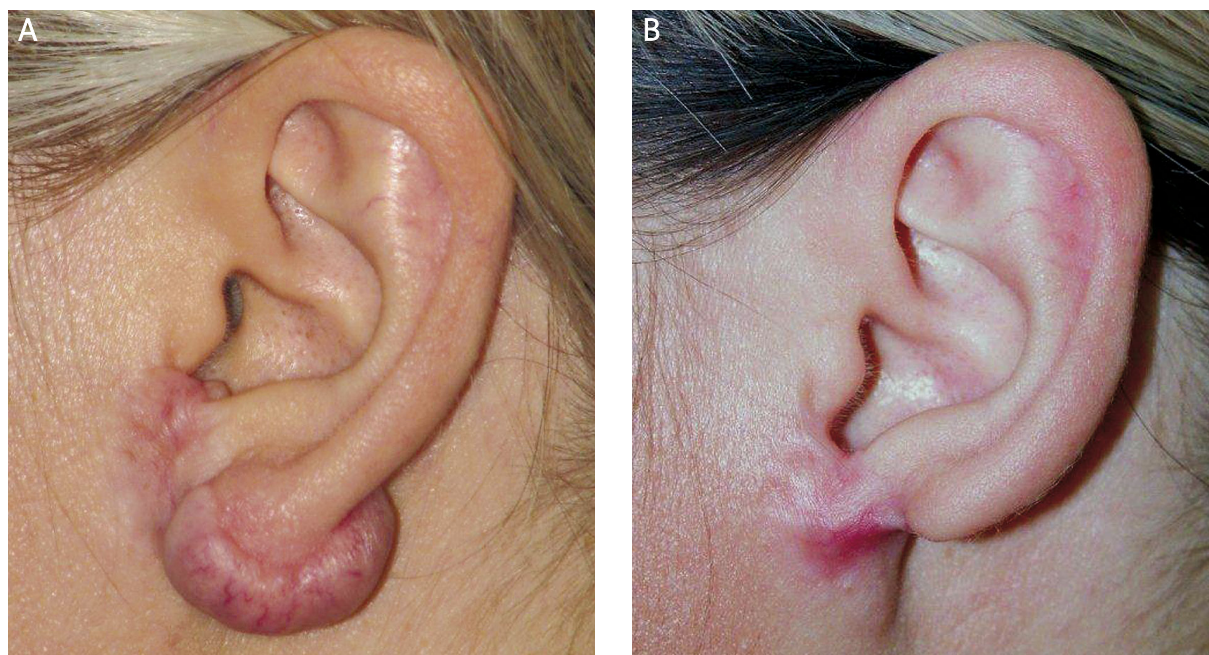
Accepting the lack of recurrence after the treatment as the main criterion, good results were obtained in 7 out

of 8 treated patients, which was 87.5% of the study group. A recurrent growth of the keloid was observed in one female patient. Apparent deformities of the earlobes were observed in 2 patients. Due to the high risk of recurrence, reconstruction surgery was abandoned. Despite the existing deformities, the patients were generally satisfied with the treatment outcome. The scars on earlobes were elastic and soft. Skin depigmentation was observed on the treated sites in several patients. One female patient had an invisible yet palpable roughness inside the earlobe.

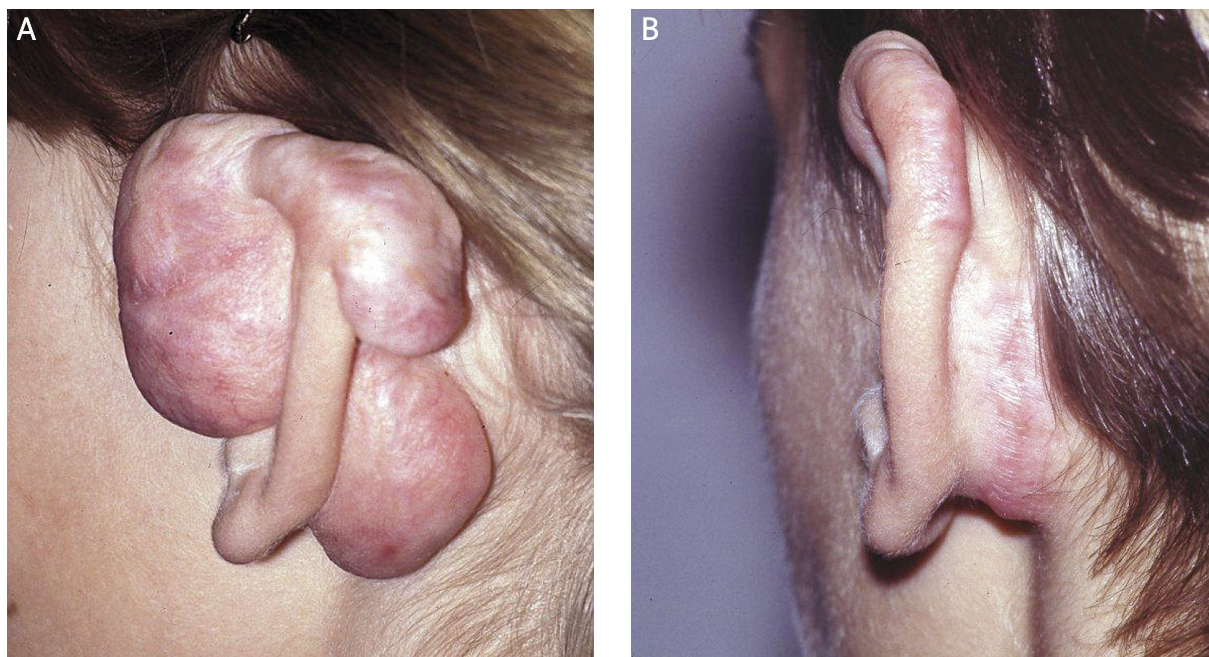
## Discussion

Auricular keloids may be formed as a result of surgical procedures, ear piercing to wear earrings, accidental cutting or burns. The treatment involves various surgical, pharmacological and physical approaches. These methods are usually combined to apply individual therapy considering the location, size of the scar and the time of scar formation. Small and "young" keloids may be effectively treated with corticosteroid injections or using special compression clips. In cases of extensive lesions, surgical intervention is only the initial step of the therapeutic procedure. Next, to prevent local recurrence, steroid injections, pressure therapy, radiation therapy or cryosurgery procedures are applied [5].

The most frequent complementary therapy is intralesional corticosteroid injections. Initial reports on the effectiveness of this approach were very encouraging (Shons and Press reported 3% of recurrence cases). However, later observations indicate only 51-67% effectiveness [6, 7].



**Figure 1. A** – Recurrent earlobe keloid after two surgical excisions. **B** – Final result after excision and cryosurgery (3 cycles)



**Figure 2. A –** Recurrent auricular keloid. **B –** One year after excision and 5 cycles of cryosurgery

Pressure therapy, usually applied in the treatment of hypertrophic burn scars, may be also used as a complementary treatment after ear keloid excision due to the specific location of the treated changes. For this purpose special clips applying pressure to the scar are used. The patients have to wear them almost 24 h a day for 6-12 months. Additionally, in order to optimise the treatment results, the clips may be coated with a silicone layer. Aköz *et al.* who combined steroid injections with silicone coated special earring obtained good results in 89% of patients treated for earlobe keloids [8].

In the case of recurrent keloids, radiotherapy is usually the treatment of choice, complementary to surgical excision. The treatment gives the best results if it is applied immediately after surgery, preferably on the first or second day. The applied doses of radiation and the ways and intervals between applications differ depending on the reported study. Usually the doses amount to 3-10 Gy and are administered in one or several (3-4) fractions. Arneja *et al.* treated 25 patients with recurrent keloids, including 64% of recurrences following surgical excisions and 36% of recurrences following corticosteroid treatment. The authors applied brachytherapy as a complementary method after surgical excision. The patients received doses of 0.5 Gy three times – immediately after the procedure and on the first and second day after excision of the pathological lesion. The authors noted 92% of good results, whereby the period of observation was 35 months on average [9].

Although the results obtained using this method are very good, it should be noted that radiation therapy poses a risk of neoplasm process induction in the irradiated

skin. The complications observed after such procedures include redness, pruritus and hyperpigmentation. Cohen and McCoy strongly indicate that radiation therapy should be applied only in elderly patients with keloids resistant to other treatments [10].

The paper presents the results of cryosurgery as a preventive treatment following surgical excision of keloids. The procedure involves topical, controlled damage of scar tissues by freezing. Direct application of low temperatures results in necrosis and cessation of blood flow through vessels. A progressive and quick decrease in temperature leads to intra- and extracellular ice crystal formation, cell dehydration, thermal shock and denaturation of lipid-protein complexes. Damaged tissues are demarcated and the undamaged surface left is the frame for the later healing process. Cryosurgery has been used since 1982 in the treatment of hypertrophic scars and keloids, alone or in combination with corticosteroid injections and/or shave scar excision [11, 12]. In our study we obtained 87.5% of good results using cryosurgery after surgical excision of keloids. The effectiveness of such procedures is comparable to radiotherapy in the treatment of recurrent keloids, but it does not pose any risk related to tissue irradiation. The high effectiveness of the reported treatment approach may result from the specific location of pathological changes, since keloids located on the face and neck are more responsive to treatment than those located on the chest and shoulders. The treatment of keloids developed in burn scars usually gives poorer results than the treatment of keloids resulting from surgical procedures or injuries, which were the object of our study. Since the cryotherapy was applied on a small surface, the proce-

ture, despite being somehow burdensome, (pain, wounds and a relatively long healing process, lasting approximately for 2 weeks) was well tolerated by the patients and side effects of cryosurgery such as skin depigmentation and atrophy were limited. Some studies report that due to the invasive nature of the treatment, the patients give up subsequent therapeutic sessions. Our study subjects were strongly determined to complete the treatment due to the earlier recurrence of pathological lesions.

## Conclusions

Cryosurgery is a very effective approach preventing keloid recurrence after surgical excision; this finding is supported by 87.5% of good results in the treatment of recurrent lesions. The effectiveness of this method may result from the specific location of keloids and a relatively small surface of tissue subjected to freezing, which enables complete damage of keloids and formation of atrophic scars on these areas.

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