

Ear Keloid as an Unusual Complication of Prolonged Mask Use during the COVID-19 Pandemic

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Summary: The recent COVID-19 pandemic required many people to wear ear-loop face masks (ELFMs) for protracted periods, and ear injuries have been reported. Here, we report a rare case of a keloid on the right posterior ear that appeared to arise from prolonged ELFMs use. A 76-year-old Japanese man presented with a 7.3 × 2.2 × 1.4-cm keloid running from the medial retroauricular sulcus to the posterior lobule. The lack of keloid history suggested the absence of genetic risk factors. The patient reported extensive mask-wearing habits that were augmented by the pandemic. The keloid developed from an ear injury. Although it healed well, it started thickening 2 months later. Because local mechanical forces (eg, pressure/friction) can promote keloid growth, the ELFMs may have provoked the keloid. The patient disclosed a history of uncontrolled hypertension and diabetes mellitus, which associate with severe keloids. The whole keloid was removed via total excision, and the defect was closed primarily and subjected to 15Gy/2Fr radiotherapy. The patient was advised to use a different mask type. Twelve months later, the scar had healed without complications or recurrence and with good cosmetic outcomes. Thus, ELFMs can promote retroauricular keloid formation, possibly by imposing local pressure/friction. ELFMs may also raise local skin temperatures and humidity, thereby fostering infection, which can trigger keloids. Hypertension/diabetes may further elevate the risk of ELFMs-induced keloid. Thus, an auricular keloid is an unusual complication of prolonged ELFMs use. Combination therapy can have excellent outcomes. Patients with keloid risk factors should be advised to use face masks without ear loops. (*Plast Reconstr Surg Glob Open* 2024; 12:e5541; doi: 10.1097/GOX.0000000000005541; Published online 22 January 2024.)

The COVID-19 pandemic led to prolonged institution of compulsory mask-wearing measures to limit viral transmission. However, such intense mask use can induce skin damage such as pressure injuries to the ear.^{1,2}

Keloids are characterized by chronic dermal inflammation and extracellular-matrix (ECM) deposition that result in relentless vertical and lateral scar growth. Although the ethnic/familial predisposition to keloid is suggestive of a genetic foundation, keloid growth may also be promoted by systemic disease factors and local mechanical forces on the wound/scar.^{3,4}

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To our knowledge, this is the first report of retroauricular keloid caused by ear-loop face mask (ELFM) use. In this case report we discuss the possible etiological mechanisms and management of such lesions.

CASE REPORT

In early 2022, a 76-year-old Japanese man presented with a keloid that ran from the medial retroauricular sulcus to posterior lobule. The conchal cartilage was not involved. The 7.3 × 2.2 × 1.4-cm lesion was hard, itchy, and painful. The surface was partly de-epithelialized (Fig. 1A). The remainder was smooth but uneven. The patient reported sustaining an ear injury in 2020 that healed well but started thickening 2 months later. He initially ignored it. At 6 months, however, its ongoing growth led him to undergo conservative and ineffective therapies at dermatologists. He also reported frequent wearing of disposable ELFMs before the pandemic that was augmented by the pandemic: ELFMs were used throughout the day except during meals. The patient lacked a history/familial history of keloids and atopic or syndromic keloid-related disease, but had been diagnosed with hypertension and diabetes mellitus (DM) 30-40 years earlier, neither of which had ever been treated well.

Disclosure statements are at the end of this article, following the correspondence information.

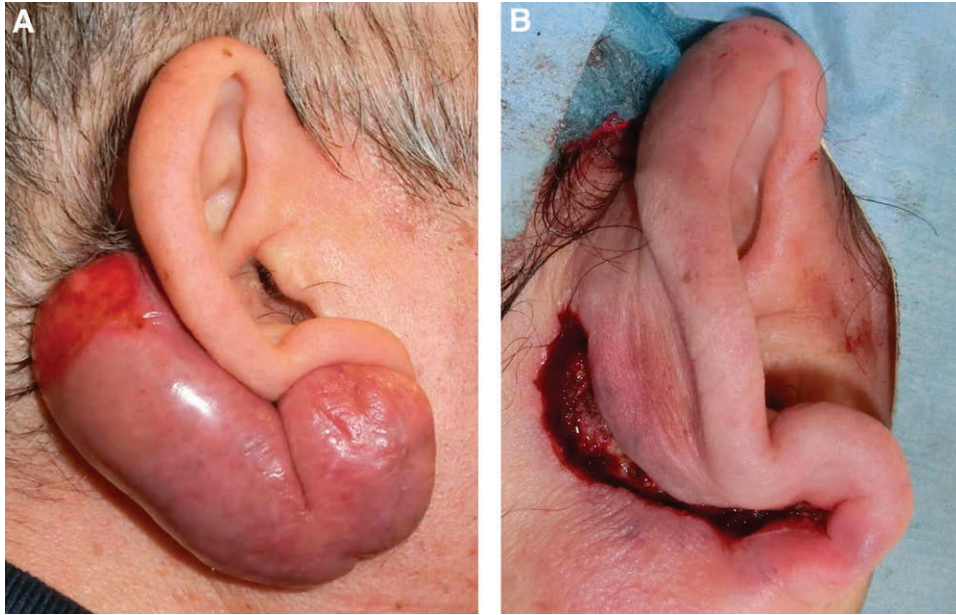


Fig. 1. Photographs taken before and after surgery. A, The keloid on the posterior right ear. B, The right ear after total excision of the keloid.

Total excision and postoperative radiotherapy were planned. The patient signed an informed consent form. While waiting for surgery, the wound on the keloid scar was treated with gentamycin ointment to prevent wound infection. The patient was asked to use masks without ear loops. Internal-medicine physicians also started to treat the hypertension and DM preoperatively.

The surgery was conducted under local anesthesia (1% xylocaine with 1:200,000 epinephrine). An incision running parallel to, and 5-mm posteriorly of, the posterior sulcus was made. Lateral dissection of the scar was conducted, and the wound was closed in a tension-free manner by separately suturing the subcutaneous and dermal layers with 5-0 pds plus. The epidermis was sutured with 6-0 polypropylene (Figs. 1 and 2). The pinna and earlobe had an acceptable appearance. Pressure dressings were applied. The patient was prescribed oral antibiotics for 3 days. Starting 24 hours after surgery, the wound and surrounding 1-cm area underwent 15 Gy per 2fr irradiation with a 6-MeV high-energy electron beam on consecutive days. Other tissues were protected with a lead mold. Ten days postsurgery, the sutures were removed. Histopathology confirmed the keloid diagnosis.

One year later, the patient was pleased with the aesthetic and functional outcomes. The scar healed well without recurrence (Fig. 3). The patient was advised to continue wearing masks without ear loops and to avoid repetitive skin injuries to preclude further keloidogenesis.

DISCUSSION

Mask wearing was a common habit among Japanese people even before COVID-19, but the pandemic greatly augmented this and has occasionally induced unusual skin injuries,⁵ particularly to the auricle.¹ This may partly



Fig. 2. The resected keloid.

reflect the injury-prone protrusion of the auricle, its thin skin, and aging due to chronic sun exposure.^{2,6}

The keloid in our case was probably promoted by a constellation of factors. The most important were the initial ear wounding and repetitive pressure/friction on the healing wound from the ELM. Normal wound healing starts with an inflammatory stage that induces the proliferative stage, where fibroblasts fill the dermal defect with ECM. In keloids, the inflammatory stage does not subside; consequently, the fibroblasts remain highly activated and continuously produce abundant ECM, thus causing scar growth. One mechanism that promotes this chronic inflammation is repetitive mechanical force on the wound/scar, which activates its exquisitely mechano-sensitive inflammatory cells/fibroblasts. Thus, the inflammation induced by ear wounding may have been unable to subside because of the pressure/friction. The ear loop



Fig. 3. The right ear 12 months after surgery and postoperative radiotherapy.

may also have elevated the humidity/skin temperature behind the ear, which could promote infection and/or infection of epithelial erosions caused by the ear loop: infection (and the resulting inflammatory response) is a well-known keloid etiology, as shown by links between keloid and acne, folliculitis, and vaccinations.^{4,7} The uncontrolled hypertension and DM history of the patient may have worsened the inflammation induced by other factors: both associate with endothelial dysfunction and vessel hyperpermeability and thus may help sustain the influx of inflammatory cells and factors into the wound/scar. Indeed, hypertension associates with keloid worsening.³ Notably, older individuals rarely develop keloids, possibly because of skin slackness and immunosenescence.⁴ Evidently however, this could not protect our patient due to the abundance of risk factors in his case.

Our case was treated with total excision and 15Gy per 2Fr radiotherapy. The adjuvant treatment reflects the fact that surgery itself induces inflammation; consequently, surgical monotherapy associates with witheringly high keloid-recurrence rates.⁸ In our institution, we have reduced keloid-recurrence rates to less than 10% by combining tensionless/tension-breaking surgical procedures with electron-beam (β -ray) irradiation. The latter provides optimal dose distribution, greater safety, and selective targeting of the reticular dermis, which is where keloids arise. Our radiotherapy protocol is also tailored to reflect the

disparities in mechanical forces on different body regions: for example, the highly tense anterior chest receives 18Gy per 3Fr, and lower tension sites (including the posterior ear) receive 15Gy/2Fr.⁹

The fact that keloid-extirpation surgery must be followed by postoperative radiotherapy shapes surgical decision-making: it is preferable to close keloid-resection sites primarily (but without tension) because irradiation can prevent the uptake of the skin grafts or local flaps that are needed for tensionlessly covering larger defects.¹⁰ Consequently, in our case, we used the total-excision method to remove the keloid mass.

Postoperative radiotherapy may also be particularly important for patients with systemic diseases that affect endothelial function (eg, hypertension): it may suppress the dysfunctional endothelial cells, thereby preventing unwanted blood-vessel formation, reducing inflammation, and suppressing new keloid formation.^{8,9}

Thus, an auricular keloid can be a complication of prolonged EFM use. Combination therapy can have excellent outcomes. Patients with keloid risk factors should be advised to use face masks without ear loops.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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