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Development of keratoacanthoma following CO_2 laser resurfacing: a case report and literature review

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Abstract

CO_2 laser resurfacing is a widely used cosmetic procedure for facial rejuvenation, addressing wrinkles, scars, and other skin imperfections. Although complications are rare, post-laser skin lesions have been reported, particularly in patients with a history of non-melanoma skin cancer (NMSC). This report presents a rare case of a 41-year-old female that developed a solitary keratoacanthoma (KA) 3 weeks after CO_2 laser resurfacing. A detailed medical history was taken, and an excisional biopsy was performed. Histopathological examination confirmed KA, a rare but documented complication of fractional laser resurfacing. The lesion was excised without recurrence, and healing was uneventful. This case is unique because the patient had no prior NMSC history, making KA an unusual occurrence. Previous studies typically associate KA with known risk factors such as NMSC or immunosuppression. This report highlights the importance of post-laser surveillance, even in patients without recognized risk factors. It contributes to the understanding of potential complications of CO_2 laser resurfacing, emphasizing the need for clinical awareness.

Keywords: cosmetic dermatology, cosmetics, dermatoscopy, laser, tumor

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Introduction

CO_2 laser resurfacing is a popular cosmetic procedure used for facial rejuvenation, addressing concerns such as wrinkles, scars, and other skin imperfections (1, 2). Although complications from this procedure are rare, the occurrence of post-laser skin lesions has been documented, particularly in patients with a history of non-melanoma skin cancer (NMSC) (3). These lesions can include keratoacanthomas (KA) or other atypical growths (4). This case report presents a rare instance of a 41-year-old female that developed a solitary KA after undergoing fractional CO_2 laser resurfacing despite the absence of known risk factors.

Case report

A 41-year-old female with no significant past medical history underwent facial rejuvenation via fractional CO_2 laser resurfacing. The procedure was carried out without any complications, and she reported no previous history of NMSC or other dermatologic conditions.

Three weeks post-procedure, a solitary lesion was identified on the right cheek. The lesion was 1.5 × 1.2 cm in size, nodular in appearance, firm, well-circumscribed, and raised, with surrounding skin appearing normal (Fig. 1A). There were no indications of inflammation, infection, or discomfort. The patient reported no pain or discomfort associated with the lesion.

Dermoscopic examination revealed a dome-shaped nodular lesion with a central keratin plug surrounded by irregularly branching blood vessels and white structureless areas (Fig. 1B). Due to the nodular nature of the lesion and the variability in the blood vessels, a biopsy was performed to rule out malignancy. Histopathological examination of the biopsy specimen confirmed the diagnosis of KA (Fig. 2).

The patient underwent excision of the lesion, and no recurrence was observed at subsequent follow-up visits. Healing was uneventful.

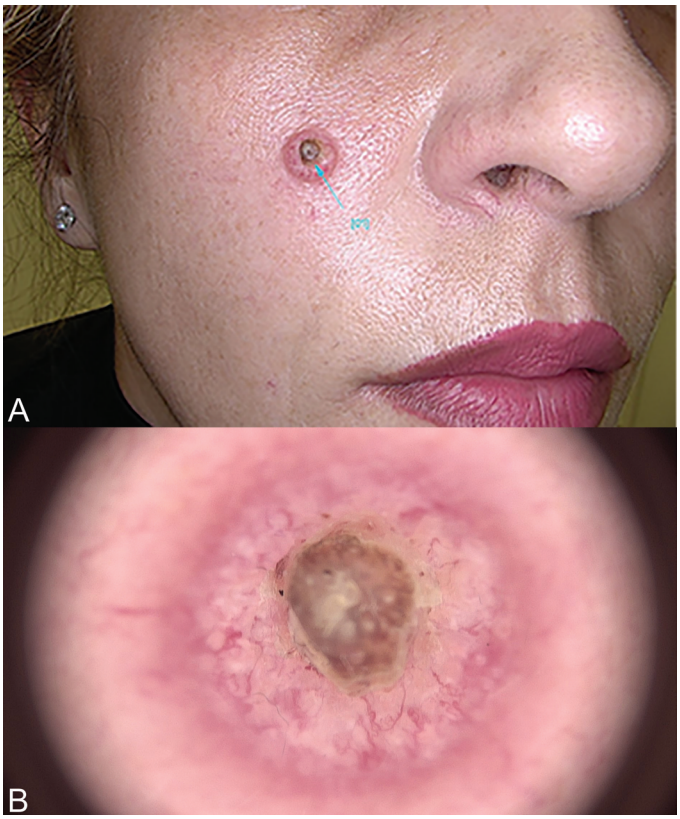

Figure 1 | Dome-shaped nodular lesion with central keratin plug on the right cheek: A) macro image; B) dermatoscopic image of the lesion, irregular branching blood vessels and white structureless zones can be seen surrounding the central keratin plug, 20×.

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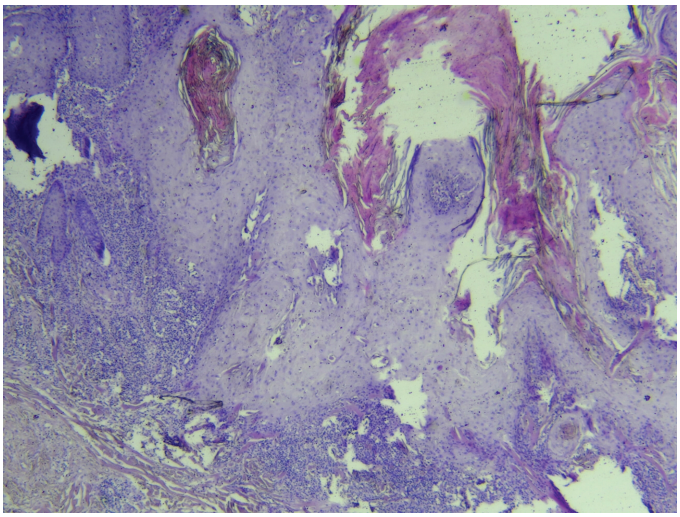

Figure 2 | Histopathological image of the excised lesion confirming keratoacanthoma (hematoxylin&eosin).

Discussion

KA is a rapidly growing well-differentiated squamous proliferation that often shares histopathological features with squamous cell carcinoma (SCC) but may exhibit spontaneous regression. It is typically linked to factors such as chronic sun exposure, immunosuppression, and a prior history of NMSC (1, 3). KA has also been observed to arise following cutaneous trauma, including surgical procedures, burns, and other injuries (5), suggesting a potential role of trauma-induced epidermal hyperplasia. However, KA has also been documented as a rare complication following CO_2 laser resurfacing, further supporting the idea that skin-directed trauma may contribute to its pathogenesis.

This case is particularly noteworthy because the patient lacked a history of NMSC and developed a solitary KA after laser treatment—a rare but documented complication of CO_2 laser resurfacing. This contrasts with previous reports that described multiple eruptive KAs in individuals with known risk factors (3). Although isolated cases such as this do not justify changes in standard monitoring protocols, they may contribute to heightened clinical awareness and support careful observation of unexpected post-procedural lesions, even in patients without established risk factors.

The exact pathogenesis of KA development following laser resurfacing remains unclear. However, trauma-induced epidermal proliferation has been proposed as a potential mechanism. Fractional CO_2 laser resurfacing induces controlled dermal injury, triggering a cascade of inflammatory and reparative responses that may lead to abnormal keratinocyte proliferation (6). The role of cytokine dysregulation, particularly tumor necrosis factor alpha (TNF-α) and transforming growth factor beta (TGF-β), has been implicated in the formation of KA-like lesions following cutaneous trauma (7). In addition, alterations in p53 expression, frequently observed in KA, suggest a possible role for laser-induced DNA damage in its pathogenesis (8).

There are no evidence-based preventive strategies to specifically avoid KA formation after laser resurfacing. However, it is prudent to identify individuals at risk (e.g., immunosuppressed, or prior history of KA or SCC) and to provide close clinical monitoring in the weeks following the procedure. Early excision and histologic confirmation remain the standard approach when new lesions appear.

Although spontaneous resolution of KA has been reported, surgical excision remains the preferred treatment to mitigate risks of uncontrolled growth, local invasion, and scarring (1). Our single case cannot confirm a causative mechanism, but it may be viewed in the context of existing hypotheses that suggest individual factors—such as skin type, immune response, and post-procedure care—could influence the development of KA following laser resurfacing. These considerations remain speculative and are based on previously published observations. More studies are needed to clarify the underlying mechanisms and identify preventive strategies for this rare but significant complication.

Conclusions

To our knowledge, although cases of KA developing after CO_2 laser resurfacing have been described, this is the first reported instance of a solitary KA occurring in a patient without any prior history of NMSC or known risk factors. Previous reports have primarily involved multiple lesions or patients with a background of NMSC, suggesting a predisposition. This case expands the spectrum of possible presentations and highlights that such lesions may also arise in low-risk individuals following laser procedures.

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