Solitary Eruptive Keratoacanthoma Developing at Site of COVID-19 Vaccine Injection

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INTRODUCTION

Keratoacanthomas (KA) are cutaneous tumors which typically present as dome-shaped nodules with central keratin-filled crater.[1] Due to relative paucity of data, their epidemiology, classification, and management have remained somewhat controversial.[2,3] Most often, KAs are classified as a variant of cutaneous squamous cell carcinoma which may spontaneously regress, but rarely have the potential to behave in a more aggressive manner and metastasize.[2] Surgical excision with clear margins is the current standard of treatment.[4] KAs commonly occur in sun-exposed areas of the skin and in those with Fitzpatrick skin types I to III.[2] Thus, ultraviolet radiation has been postulated to play a role in their development.[2]

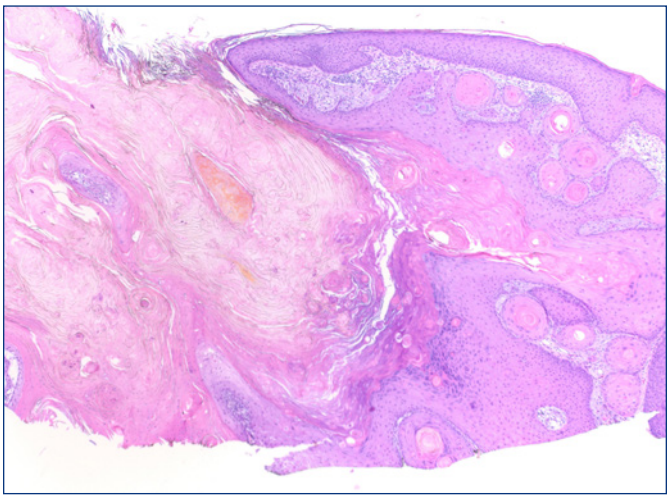
More rarely, KAs have been reported to occur in sites of iatrogenic or accidental trauma.[5] While the etiology of such KAs remains unknown, it is hypothesized to be associated with local wound-healing response. Development of KAs following injection of pneumococcal and smallpox vaccines has been previously reported[5]; however, KA occurring at the vaccination site after COVID-19 vaccination has not yet been described in the literature. Herein, we report a case of development of a solitary KA at the site of COVID-19 vaccine injection.

CASE REPORT

A 66-year-old male with past medical history of osteoarthritis presented for evaluation of a new, painful, solitary lesion on the right shoulder. The patient had received his first and second doses of the Moderna COVID-19 vaccine approximately nine and ten months prior to presentation (in February and March of 2021 respectively), both administered in the right arm. He had subsequently received his third booster dose of the Moderna COVID-19 vaccine in the right arm six weeks prior to presentation (October 2021). Within a week of receiving this third booster dose, the patient noted development of a new skin lesion in exactly the same location where the third shot had been injected. He did not note any bleeding or pruritus. There was no history of fevers, night sweats, fatigue, or weight loss. The patient had not experienced any other symptoms following administration of the vaccine. The patient had no other chronic medical conditions, no allergies, nor was he was not taking any medications. The patient did not have any prior history of skin cancer or inflammatory skin disease.

Figure 1. Lesion on initial presentation. Overlying the right deltoid there was a 1.5 cm firm, pink nodule with crateriform center.

Figure 2. Histopathology, H&E 40x Magnification. Histologic examination shows a crateriform, atypical proliferation of keratinocytes with prominent pink, glassy cytoplasm, consistent with a squamous cell carcinoma, keratoacanthomatous type.



On examination, the patient had Fitzpatrick skin type II. Overlying the right deltoid was a 1.5 cm firm, pink nodule with crateriform center (**Figure 1**). Histologic examination of a skin biopsy at that time showed a crateriform, atypical proliferation of keratinocytes with prominent pink, glassy cytoplasm, consistent with a squamous cell carcinoma, keratoacanthomatous type (**Figure 2**).

Figure 3. Persistent lesion on examination one month following presentation.

The patient presented one month later for surgical excision of the KA. The lesion was persistent and had increased in size to 1.7 cm by 1.4 cm (**Figure 3).** The lesion was excised with 3–5 mm margins, and subsequent histologic examination confirmed complete excision of residual squamous cell carcinoma, keratoacanthomatous type.

DISCUSSION

Keratoacanthomas (KA) are squamous proliferations that are typically classified as a variant of squamous cell carcinoma.[2] They most often occur as solitary lesions, but disorders in which multiple KAs may arise have been reported, such as multiple self-healing squamous epithelioma (MSSE) and generalized eruptive keratoacanthomas of Grzybowski.[3] Factors postulated to predispose to KA development include chronic exposure to UV radiation, Fitzpatrick skin types I–III, exposure to chemical carcinogens, immunosuppression, certain viruses, and some genetic syndromes.[5] Trauma, iatrogenic or accidental, has also been described to result in occurrence of KAs.[5] The etiology of KAs occurring after trauma remains unknown but has been thought to be associated with wound-healing response, particularly in skin that has previously been exposed to carcinogens such as UV radiation.[3] Our case describes a rare occurrence of a KA in the site of COVID-19 vaccination.

Accidental traumatic insults reported to lead to development of KA have included injury with a thorn, dog scratch, cutaneous injuries incurred during a motor vehicle accident, and arthropod bites.[5] Iatrogenic insults previously described include cryotherapy, carbon dioxide laser resurfacing, fractional photothermolysis, skin grafting, Mohs micrographic surgery, and excisions.[5,6] There have also been multiple reports of KA following surgical excision of benign or malignant lesions.[7] KAs have also been described in association with skin diseases that cause cutaneous disruption, such as psoriasis, eczema, stasis dermatitis, milia, and rosacea.

Herein, we presented a case of occurrence of a solitary KA at the site of COVID-19 vaccine administration. While solitary cases of KAs following pneumococcal and smallpox vaccines have previously been described[8,9], development of KA following COVID-19 vaccination has not yet been reported. With emergence of the COVID-19 pandemic, and subsequent development of vaccinations for COVID-19, there has been a concerted effort for vaccination. It is important for both physicians and patients to be aware of adverse cutaneous reactions that can occur following COVID-19 vaccination, so that these can be appropriately diagnosed and managed. Local injection site reactions such as tenderness, erythema, pruritus, and edema have been described immediately following vaccination.[10] Delayed reactions, such as "COVID arm" – a tender indurated plaque developing at the injection site – have also been described.[10] Our case report adds to the literature by describing development of a malignant lesion that may occur following COVID-19 vaccination, and warrants prompt recognition and treatment.

References

1. Kwiek B, Schwartz RA. Keratoacanthoma (KA): An update and review. *J Am Acad Dermatol*. 2016;74(6):1220-1233. doi:10.1016/j.jaad.2015.11.033
2. Schwartz RA. Keratoacanthoma: A Clinico-Pathologic Enigma. *Dermatol Surg*. 2004;30(s2):326-333. doi:10.1111/j.1524-4725.2004.30080.x
3. Karaa A, Khachemoune A. Keratoacanthoma: a tumor in search of a classification. *Int J Dermatol*. 2007;46(7):671-678. doi:10.1111/j.1365-4632.2007.03260.x
4. Schell AE, Russell MA, Park SS. Suggested Excisional Margins for Cutaneous Malignant Lesions Based on Mohs Micrographic Surgery. *Jama Facial Plast Su*. 2013;15(5):337-343. doi:10.1001/jamafacial.2013.1011
5. Pattee SF, Silvis NG. Keratoacanthoma developing in sites of previous trauma: A report of two cases and review of the literature. *J Am Acad Dermatol*. 2003;48(2):S35-S38. doi:10.1067/mjd.2003.114
6. Bunker CB. Keratoacanthoma, Trauma, and Cryotherapy. *Dermatol Surg*. 2011;37(11):1709. doi:10.1111/j.1524-4725.2011.02152.x
7. Goldberg LH, Silapunt S, Beyrau KK, Peterson SR, Friedman PM, Alam M. Keratoacanthoma as a postoperative complication of skin cancer excision. *J Am Acad Dermatol*. 2004;50(5):753-758. doi:10.1016/j.jaad.2003.11.065
8. Bart RS, Lagin S. Keratoacanthoma Following Pneumococcal Vaccination: A Case Report. *J Dermatologic Surg Oncol*. 1983;9(5):381-382. doi:10.1111/j.1524-4725.1983.tb00820.x
9. Haider S. Keratoacanthoma in a smallpox vaccination site. *Brit J Dermatol*. 1974;90(6):689-690. doi:10.1111/j.1365-2133.1974.tb06699.x
10. Bellinato F, Maurelli M, Gisondi P, Girolomoni G. Cutaneous Adverse Reactions Associated with SARS-CoV-2 Vaccines. *J Clin Medicine*. 2021;10(22):5344. doi:10.3390/jcm10225344

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Funding sources

No funding sources to report for this manuscript.

Conflicts of interest

The authors have no conflicts of interest or financial disclosures, and all authors had access to the data and a role in writing the manuscript.

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