

## Pilomatricoma Developed After SARS–CoV–2 mRNA Vaccine Inoculation

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The United States' Food and Drug Administration had authorized the use of the COVID-19 vaccine since 2020 due to the COVID-19 pandemic. Vaccines developed by Pfizer/BioNTech, and Moderna are unique mRNA vaccines with different manufacturing processes, among the different types of vaccine platforms.

As vaccination rates have increased, cutaneous adverse events have been reported. Injection site reaction was the most common adverse event, followed by urticaria, morbilli-

form eruptions, and aggravation of existing skin diseases<sup>1</sup>. While similar events have been reported with other vaccines, there have been no reports of unique adverse events, such as skin symptoms similar to those seen in COVID-19 patients or skin lesions that may appear at the hyaluronic filler injection site<sup>1</sup>. In this paper, we describe a case of pilomatricoma that developed after receiving the COVID-19 vaccine.

A nodule on the left upper arm of a 76-year-old woman was noticed. Two months prior to consultation, the patient received a COVID-19 vaccine injection in the left upper arm (Comirnaty™ Injection, Pfizer/BioNTech). Pain and edema remained at the site for a long time after that. She reported seeing clinical signs of infection at the site three weeks later, at her second inoculation visit. Therefore, she received antibiotics and a second inoculation in her right arm. However, there was no improvement. There was an indurated subcutaneous nodule in the left upper arm when she came to our hospital, with erosion on the overlying epidermis (Fig. 1). A biopsy revealed a well-circumscribed tumor within the dermis after an excisional procedure (Fig. 2). Basaloid cells were found in the tumor's periphery, while ghost cells were found in the center. Additionally, giant cells were discovered, which are transitional cells that represent the process of a basaloid cell becoming a shadow cell. The patient was diagnosed with pilomatricoma based on histological findings. Her pilomatricoma lesion was removed after the biopsy.

Pilomatricoma is a benign tumor of the head and neck that develops from hair matrix cells and presents as an asymptomatic subcutaneous nodule<sup>2</sup>. However, the pathogenesis of pilomatricoma is not yet fully understood. After trauma,



**Fig. 1.** 1 × 1 cm sized hard subcutaneous nodule in the left upper arm with eroded epidermis

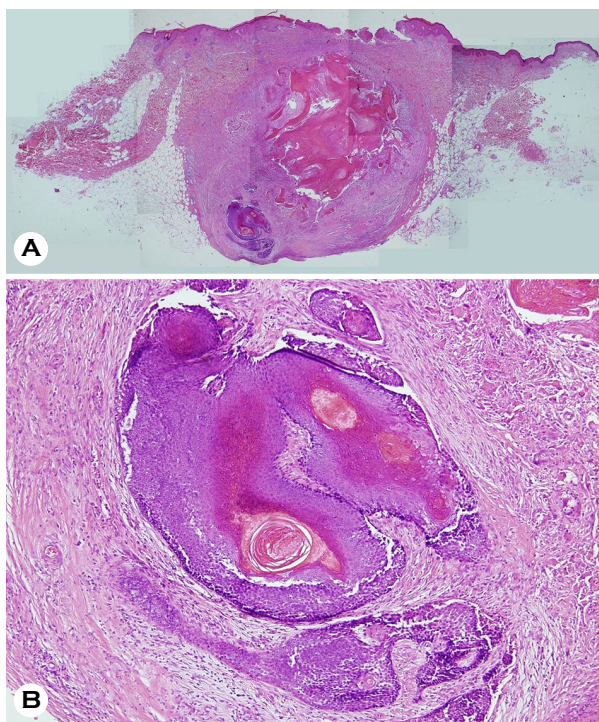
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**Fig. 2.** (A) There is a well-circumscribed tumor in the dermis (H&E,  $\times 40$ ). (B) The periphery of the tumor was surrounded by basaloid cells and ghost cells presented in the center. Transitional cells that indicate the process of changing the basaloid cell to shadow cell are seen (H&E,  $\times 100$ ).

approximately 9% of patients have been reported to develop pilomatricoma (e.g., insect bite, vaccine, etc.). It's also been linked to subcutaneous methotrexate injections and vaccinations like BCG, tetanus, hepatitis A, and influenza<sup>2-5</sup>. The assumptions regarding the mechanism of pilomatricoma after trauma are as follows: Needlestick injury damages the follicular epithelium, resulting in faulty apoptosis suppression and the formation of pilomatricoma. Inflammation can be aggravated by the attenuated agent itself or by adjuvants in vaccines<sup>2-5</sup>. However, needlestick injury itself is a more important trigger of pilomatricoma, because there are reported cases of pilomatricoma developing after injection of drugs other than the vaccine<sup>2-5</sup>. After inoculation, the patient's inflammation persisted, with lymphocytes and giant cells infiltrating the area. Although this is not the first reported case of pilomatricoma developing after receiving the vaccine, it is the first case of pilomatricoma developing after receiving an mRNA vaccine, to the best of our knowledge.

**Key Words:** COVID-19 vaccine, mRNA vaccine, Pilomatricoma

## CONFLICT OF INTEREST

In relation to this article, we declare that there is no conflict of interest.

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## PATIENT CONSENT STATEMENT

The patient provided written informed consent for the publication and the use of her images.

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