Case of Pilomatricoma After Coronavirus Disease 2019 Vaccination

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The coronavirus disease 2019 (COVID-19), which is an infection caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), spread worldwide including Japan. This COVID-19 pandemic has changed the way of life around the world. To prevent the spread of infection, several COVID-19 vaccines were rapidly developed and their vaccination is recommended. While safety and effectiveness of these vaccines have been shown, various adverse reactions occur with a certain frequency.
Pilomatricoma is a benign subcutaneous tumor. Cause of pilomatricoma is unclear, however, an external insult could be a cause of part of pilomatricoma. Herein, we report a rare case of pilomatricoma after COVID-19 vaccination. Pilomatricoma should be included in the differential diagnoses of nodular lesions arising after vaccination sites, including the COVID-19 vaccine.

Key words: pilomatricoma, calcifying epithelioma, COVID-19, vaccination

INTRODUCTION

The coronavirus disease 2019 (COVID-19) originated in Wuhan, China in 2019 and spread worldwide. The World Health Organization (WHO) reported that 256 million people worldwide had been infected, with 5.14 million deaths by November 2021. In Japan, the Ministry of Health, Labour and Welfare (MHLW) reported that more than 10 million infections with 30,000 deaths had been confirmed by July 2022. This COVID-19 pandemic has changed the way of life around the world, including social distancing, mask-wearing requirements, travel restrictions, curfews, and so on. COVID-19 is an infection caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), which causes respiratory symptoms, fever, abnormal sense of smell and taste, and can lead to death from severe pneumonia.

Several COVID-19 vaccines were rapidly developed. In Japan, two mRNA vaccines, one viral vector vaccine and one recombinant protein vaccine have been available since the first vaccine was approved in February 2021. More than 60% of the total population has completed their third dose of vaccination by July 2022. While safety and effectiveness of these vaccines have been shown, various adverse reactions such as pain in the vaccination site, fever, fatigue, headache, muscle and joint pain, chills, etc. occur with a certain frequency. Herein, we report a rare case of pilomatricoma after COVID-19 vaccination.

CASE REPORT

A 43-year-old Japanese female presented a subcutaneous tumor on her left upper arm at the area where she received her first COVID-19 vaccination (Pfizer-BioNTech). A subcutaneous nodule appeared immediately after the vaccination and became larger 5 months later. On our initial dermatological examination, we noticed a hard, well-demarcated, multilocular, 17 x 15 mm, subcutaneous tumor on her left upper arm with redness (Fig. 1). We suspected it as pilomatricoma or foreign-body granuloma caused by the vaccination. Ultrasound examination revealed a hypoechoic mass with internal hyperechoic punctate in the deep dermis with some acoustic shadows (Fig. 2). Color doppler imaging revealed blood flow signals at the margins of the mass. Blood test showed no abnormal findings. The tumor was totally removed with surgical excision. On histopathological examination, a well-demarcated tumor which was composed of anucleated cells with eosinophilic cytoplasm (shadow cells) in the deep dermis (Fig. 3A). In the peripheral zone of the tumor, basophilic cells gradually transitioned into shadow cells (Fig. 3B). Numerous foreign body giant cells were also observed in the tumor (Fig. 3C). Together, these findings led to the diagnosis of pilomatricoma. There were no mentionable symptoms on her second COVID-19 vaccination (Pfizer-BioNTech) site on her left upper arm, and she has not yet received her third vaccination.

DISCUSSION

Pilomatricoma, also known as calcifying epithelioma, is a benign tumor that shows differentiation from hair follicle matrix to hair matrix, hair cortex, follicular infundibulum, outer root sheath, and hair bulge [1]. Pilomatricoma is a subcutaneous tumor that is hard and freely mobile and surrounded by a fibrous capsule [1]. It is usually solitary but can occur in multiples [1]. Pilomatricoma is mainly occurs in pediatric popula-

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Fig. 1 A subcutaneous tumor with redness, on the vaccination site of her left upper arm.

Fig. 2 Ultrasound examination revealed a hypoechoic mass with internal hyperechoic punctate in the deep dermis with some acoustic shadows.

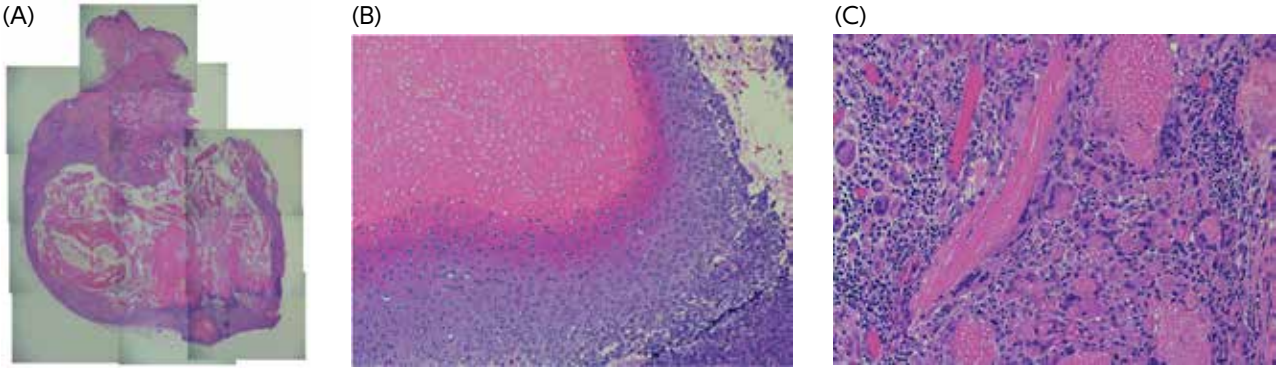

Fig. 3 (A) A well-demarcated tumor which is composed of anucleated cells with eosinophilic cytoplasm (shadow cells) in the deep dermis (HE, x 40).
(B) Basophilic cells gradually transition into shadow cells (HE, x 200).
(C) Numerous foreign body giant cells (HE, x 200).

tion [1]. 90% of patients are younger than the age of 10, however, another small onset peak is between the ages of 50 and 65 [1]. There is a slight female predilection [1]. Pilomatricoma often presents with blister or ulcer [2–5], but ultrasound examination findings are useful in the diagnosis. The differential diagnosis includes sebaceous and epidermoid cysts, epitheliomas, neurofibromas, foreign body reactions, calcified cysts, or hematomas, chondromas, fibroxanthomas, osteoma cutis, and giant cell tumor [1]. The final diagnosis is made histopathologically.

Cause of pilomatricoma is unclear, however, it is known that an external insult such as trauma, insect bites, or surgery could be a cause of part (3.9%) of pilomatricoma [1], as well as persistent inflammation or the inoculated attenuated against itself [5]. Other reports have suggested that needlestick injury or similar trauma may cause damage to the follicular epithelium at the injection site which may lead to a faulty suppression of apoptosis, in turn resulting in the formation of pilomatricoma [6]. There are a few cases of pilomatricoma reported after various vaccinations [2–5]. Among these cases that we have reviewed, two cases were due to influenza vaccine [3, 5], one case was due to Bacille Calmette-Guérin (BCG) vaccine, and one case was due to hepatitis A vaccine [5]. Although a unique transdermal BCG vaccination with 9 short needles is used in Japan, intradermal BCG vaccination is standard worldwide. All cases of pilomatricoma occurred on the vaccination site of their left upper arms. All cases were female at the ages of 13, 7, 7, and 9, respectively [2–5]. To our best knowledge, our case is the first case report of pilomatricoma after COVID-19 vaccination. The type of vaccine such as live, inactive, or mRNA, and the route of injection such as intradermal, subcutaneous, or intramuscular would not affect pilomatricoma development.

While pilomatricoma is a benign tumor that can be observed without further treatment, surgical excision is the treatment of choice [1]. There are no current guidelines on appropriate margins, and there is a 2% to 6% chance of recurrence in cases of incomplete excisions [1].

Herein, we report a rare case of pilomatricoma

emergence after the administration of COVID-19 vaccine. In conclusion, although additional vaccinations or annual vaccinations of COVID-19 are required in the future, pilomatricoma after COVID-19 vaccination is rare and no need to restrict additional COVID-19 vaccinations.

CONFLICT OF INTEREST

None.

REFERENCES

1) Le C and Bedocs PM. Calcifying Epithelioma of Malherbe. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan.
2) Aquilina S, Gatt P, Boffa MJ. Pilomatricoma arising at a BCG vaccination site. Clin Exp Dermatol. 2006; 31: 296–7.
3) Jeon H, Jeong SH, Dhong ES, Han SK. Pilomatricoma arising at an influenza vaccination site. Arch Plast Surg. 2014; 41: 775–7.
4) Tas B, Tas E, Sar M. A Bullous Pilomatricoma Developed after Hepatitis A Vaccination. West Indian Med J. 2015; 64: 166–7.
5) Zhang H, Jin J, Chen X, Cai L, Zhang J, Wen G. Bullous Pilomatricoma After Influenza Vaccination. Clin Cosmet Investig Dermatol. 2022; 15: 657–660.
6) Malpathak VD, Zawar VP, Chuh AA, Ghadi PS. Giant pilomatricoma (pilomatrixoma) following an intramuscular injection. J Dermatol Case Rep. 2008; 2: 11–13.