

## CASE REPORT

# COVID-19 vaccination and alopecia areata: a case report and literature review

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## Abstract

Coronavirus disease 2019 (COVID-19) is a major concern worldwide and various vaccines have been developed and approved for it, however some immune-related issues of COVID-19 vaccines should be considered and individualized for patients. In this study we report two cases of rapidly progressive hair loss following COVID-19 vaccination.

## KEYWORDS

alopecia areata, COVID-19 vaccines

## 1 | INTRODUCTION

Over 468 million infections and more than 6 million deaths worldwide have been caused by the Coronavirus disease 2019 (COVID-19).<sup>1</sup> Various vaccines have been developed and approved for COVID-19 globally. Due to the new variants (e.g., Omicron), the use of additional doses is also being reviewed and approved for prevention.<sup>2</sup> There is still insufficient information on the immune-related issues of COVID-19 vaccines and whether or not they can cause the flare of autoimmune diseases.<sup>3</sup> This study reports on two patients who developed rapidly progressive hair loss following COVID-19 vaccination.

## 2 | CASE PRESENTATION

A 23-year-old woman presented to the dermatology clinic with complaint of local hair loss on her scalp a week after

receiving the first dose of Oxford/AstraZeneca COVID-19 vaccine (AZD1222) in August 2021. She also reported myalgia following the vaccination, which was relieved by acetaminophen. She had no past medical or family history of alopecia areata (AA) and had not received any medications. A positive pull test demonstrated oval-shaped patchy hair loss with defined borders and no scarring or scaling. Her KOH test was negative. Treatment with betamethasone cream 0.1% and pimecrolimus cream 1% started immediately for her after the diagnosis of AA. After 3 weeks, the patient returned with total hair loss on the scalp and eyebrows (Figure 1). Laboratory tests including COVID-19 and antinuclear antibody test, CBC, and liver, kidney, and thyroid functions were all normal with the exception of elevated anti-thyroid peroxidase (anti-TPO). Our diagnosis was confirmed when the biopsy revealed peribulbar lymphocyte infiltration with increased miniaturized hairs. Treatment with systemic corticosteroid (oral prednisolone, 300 mg monthly, for 3 months) was started

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**FIGURE 1** Case 1, total hair loss on the scalp and eyebrows



**FIGURE 2** Second case, scalp diffuse hair loss

for improvement. We asked the patient to return after hair regrowth to taper her medication, and also offered her tofacitinib (a systemic JAK/STAT pathway inhibitor) as another treatment option, which was refused by the patient given its high costs in our country.

The second case, a 26-year-old woman with a history of AA relieved by an intralesional corticosteroid, presented with complaint of generalized hair loss on the scalp 2 weeks after receiving the second dose of AZD1222 in January 2021. The condition had started with patchy alopecia, and over the course of a month, it had evolved to diffuse hair loss. She reported infection with COVID-19 1 year before.

A physical examination revealed diffuse hair loss only throughout the scalp, with no scarring or scaling (Figure 2). Laboratory tests were normal except for increased anti-TPO.

A diagnosis of alopecia totalis was made for her based on her history and physical characteristics, and treatment with systemic corticosteroid was initiated (oral prednisolone, 300 mg monthly, for 3 months). The patient was asked to return after hair regrowth to taper her medication. The

other treatment option was tofacitinib, which was again refused by this patient for the same reason as the first case.

### 3 | DISCUSSION

The SARS-CoV-2 virus can make the immune system overactive due to the interaction and molecular mimicry between the virus and self-antigens. Similar to the disease itself, COVID-19 vaccines can increase inflammatory responses.<sup>4</sup> NF- $\kappa$ B activation, which leads to the release of many cytokines, and elevated IFN and IL-6, are linked to AA pathology and might cause hair loss.<sup>5</sup> AZD1222 expresses the S glycoprotein, which stimulates both antibody production and Th1 cell activation.<sup>4</sup> This type of hair loss has also been noticed among recipients of other types of COVID-19 vaccines, such as BNT162b2 (Pfizer–BioNTech) and mRNA-1273 (Moderna)<sup>6</sup> (Table 1). There has been a history of AA in the majority of the cases reported in the literature<sup>3,6,7</sup> but some of the reported cases<sup>6,8</sup> and one case in our study have no personal or family

TABLE 1 AA cases that reported after COVID-19 vaccination

Case	Sex	Age	Vaccine type	PMH	Flare time after vaccination	Severity of hair loss	Time	Ref
1	F	32	AstraZeneca	AA	Few days	Patch	June 2021	6
2	F	76	Pfizer	AA	After 2 weeks of first dose	Patch	March 2021	3
3	F	59	AstraZeneca	AA/autoimmune thyroiditis	3 weeks after the vaccine	Patch	March 2021	3
4	F	29	AstraZeneca	AA	2 weeks after first dose	Patch	March 2021	3
5	M	80	Pfizer	NA	1 weeks after first dose	Totals	Not reported	7
6	F	33	Moderna	Steatosis, chronic hepatitis B	2 months after 2nd dose	Patch	March 2021	5
7	F	57	Pfizer	AA	4 months after 2nd dose	Totals	February 2021	5
8	F	62	Moderna	AA	2 months after 2nd dose	universalis	June 2021	5
9	F	28	Pfizer	AA, Hashimoto thyroiditis	A week after 2nd dose	universalis	June 2021	5
10	F	29	Pfizer	Elevated levels of TgAb and TPOAb	1 week after 2nd dose	Patch	April 2021	5
11	M	22	Moderna	Elevated TgAb	1 month after 2nd dose	Patch	April 2021	5
12	M	15	Pfizer	NA	Within 1 week after 2nd dose	Patch	June 2021	5
13	M	61	Pfizer	Joint pain	2 weeks after 1st dose	Totals	March 2021	5
14	M	16	Pfizer	NA	Within 1–2 weeks after 1st dose	Patch	June 2021	5
15	F	23	AstraZeneca	Elevated TPOAb	1 week after first dose	Totals	August 2021	Present study
16	F	26	AstraZeneca	AA/elevated TPOAb	2 weeks after second dose	Totals	January 2021	Present study

Abbreviations: AA, alopecia areata; NA, not applicable; TgAb, thyroglobulin autoantibody; TPOAb, thyroid peroxidase antibody.

history of AA. Vaccines have been suggested as potential triggers for autoimmune diseases, mostly in genetically susceptible individuals, and have also been proposed as a probable cause of AA. Herpes zoster, hepatitis B, Japanese encephalitis, influenza, and quadrivalent HPV (HPV 6, 11, 16, and 18). COVID-19 vaccines have all been linked to an increased incidence of AA in studies.<sup>3,4,7</sup> Thyroid dysfunction is more common in individuals with AA than in the general population, implying that thyroid function and autoantibodies should be screened more frequently in these patients.<sup>9</sup> According to Naranjo algorithm, the occurrence of this complication is classified as a probable complication.<sup>10</sup>

Generally, there are few reports around the world about hair loss following COVID-19 vaccination, and most of the reported cases have had a previous history of the disease, and in some cases, the anti-TPO test has also been positive. To conclude, our cases and previous reported cases suggest that COVID-19 vaccines may have a role in inducing AA in genetically predisposed patients, especially those with positive anti TPO; however, further studies are required on the subject.

#### AUTHOR CONTRIBUTIONS

Dr. Zakiye Ganjei performed patient management, follow-up, and provided photographs. Dr. Mohammad Yazdan Panah, Dr. Rahem Rahmati, and Dr. Fatemeh Zari Meidani were drafting the manuscript and reviewed the literature. Dr. Azam Mosavi was responsible for revising the manuscript and also follow-up of the patient.

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None.

#### CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

#### ETHICAL APPROVAL

The authors declare human ethics approval was not needed for this study.

#### CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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