



Possible Associations Between Alopecia Areata and COVID-19 Vaccination and Infection

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Alopecia areata (AA) is an autoimmune form of hair loss, usually presenting with patchy hair loss on the scalp. The pathophysiological basis is thought to be the breakdown of the immune privilege of the hair follicle, resulting in increased aggregations of natural killer cells in follicles.¹ External factors such as emotional stress, drugs, and vaccinations have also been implicated. AA can be triggered by viral infections such as influenza,² cytomegalovirus, and the Epstein-Barr virus.³ There are a range of treatment modalities for AA; watchful waiting (spontaneous remission within 1 year occurs in up to half of patients),⁴ topical corticosteroids, intralesional corticosteroids, and topical immunotherapy are the most common. There have been reports in the literature—summarized in [Table 1](#)—of cases of AA thought to have been triggered by either COVID-19 vaccination or COVID-19 infection.

Postvaccination

The UK Medicines and Healthcare Products Regulatory Agency publishes data on the adverse events reported following COVID-19 vaccination.⁵ A total of 154 cases of AA, alopecia totalis (AT—affecting the whole head), or alopecia universalis (AU—affecting the whole body) have been reported; 50% with the BNT162b2 Pfizer/BioNTech (New York, NY), 40% with the ChAdOx1 nCoV-19 AstraZeneca (Cambridge, UK), and 10% with the mRNA-1273 Moderna (Cambridge, MA) vaccines. Although this may simply be a reflection of the proportion of each vaccine administered

in the United Kingdom, a possible association may be present. The US Centers for Disease Control and Prevention Vaccine Adverse Event Reporting System database⁶ was searched for reported cases of AA, AT, and AU following COVID-19 vaccination; it showed a total of 126 cases—114 of AA, 1 of AT, and 11 of AU. The vast majority were Pfizer/BioNTech (66%) and Moderna (29%). One must consider that some cases of mild hair loss may not have been reported, meaning that the true number of cases may be higher.

In the literature, a total of 18 patients who developed AA following COVID-19 vaccination have been described: 11 following the Pfizer/BioNTech, 4 following the Moderna, and 3 following the AstraZeneca vaccine. Most of the patients experience AA limited to the scalp, but a small number of patients progressed to AT or AU. Half of the patients (9) had a personal history of AA, and only 5 patients had no personal or family history of AA, or any other autoimmune diseases. The onset of symptoms following

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Table 1. Literature Review of Case Reports Documenting Patients Who Developed AA Following COVID Vaccine or Infection

Study title	Journal	Author	Year	Summary
Alopecia areata after SARS-CoV-2 vaccination ⁷	<i>JAAD Case Rep</i>	Scollan et al	2022	Nine patients who developed AA after COVID-19 vaccination
Alopecia areata following COVID-19 vaccination: vaccine-induced autoimmunity? ⁹	<i>Int J Dermatol</i>	May Lee et al	2022	One patient who developed AA 7 days after first dose of Pfizer/BioNTech vaccine
Recurrence of alopecia areata after covid-19 vaccination: a report of three cases in Italy ¹⁰	<i>J Cosmet Dermatol</i>	Rossi et al	2021	Three patients who developed AA after COVID-19 vaccination
Alopecia areata after COVID-19 vaccination ¹¹	<i>Clin Exp Vaccine Res</i>	Gallo et al	2022	One patient who developed AA 3 weeks after second dose of Pfizer/BioNTech vaccine
Alopecia areata after ChAdOx1 nCoV-19 vaccine (Oxford/AstraZeneca): a potential triggering factor? ¹²	<i>J Cosmet Dermatol</i>	Essam et al	2021	One patient who developed AA a few days after the Oxford/AstraZeneca vaccine. One previous AA attack 6 years ago but nil since. No family history of AA. Only involving scalp
New insights into alopecia areata during COVID-19 pandemic: when infection or vaccination could play a role ¹³	<i>J Cosmet Dermatol</i>	Bardazzi et al	2022	Three patients developed AA following COVID-19 infection and a further 3 following COVID-19 vaccination
New onset of alopecia areata in a patient with SARS-CoV-2 infection: possible pathogenetic correlations? ¹⁴	<i>J Cosmet Dermatol</i>	Rossi et al	2021	One patient developed AA 1 month post COVID-19 infection; good response to treatment
Alopecia areata in a patient with SARS-Cov-2 infection ¹⁵	<i>Dermatol Ther</i>	Sgubbi et al	2020	One patient developed AA 1 week post COVID-19 infection; no response to initial treatment
COVID-19: association with rapidly progressive forms of alopecia areata ¹⁸	<i>Int J Dermatol</i>	Fivenson	2021	One patient who developed AU following COVID-19 infection; unresponsive to treatment
Alopecia areata in a COVID-19 patient: a case report ¹⁹	<i>Dermatol Ther</i>	Capalbo et al	2021	One patient developed AA of beard 1 month post COVID-19 infection; responded to treatment but new lesions appeared after 2 weeks
Rapidly progressive alopecia areata totalis in a COVID-19 patient, unresponsive to tofacitinib ²⁰	<i>J Eur Acad Dermatol Venereol</i>	Berbert Ferreira et al	2021	One patient with a history of AT, stable on tofacitinib, developed a sudden anagen effluvium upon discontinuation of the drug when they caught COVID-19. No improvement on reintroduction of tofacitinib
Different hair loss patterns in two pediatric patients with COVID-19-associated multisystem inflammatory syndrome in children ²¹	<i>Dermatol Ther</i>	Hayran et al	2021	Two pediatric patients, 1 of whom developed AA post COVID-19 infection (with pediatric inflammatory multisystem syndrome). Limited to 1 patch on scalp
The development of dermatologic diseases in patients recovered from COVID-19 ²³	<i>Dermatol Ther</i>	Temiz and Kutlu	2021	Two patients who developed AA after COVID-19 infection (one 6 weeks after, one 8 weeks after)

AA, alopecia areata.

the vaccination in most cases ranged from a few days to 3 weeks.

Half of the cases reported are from Scollan et al's case series.⁷ The amount of hair loss ranged from patchy loss on the scalp to AT (1 patient) and AU (2 patients), and the time of AA onset postvaccination ranged from within 1 week to 4 months (with 5-9 patients being within the 2 weeks following vaccination). Three patients had a history of AA and

a further patient had a family history of AA. The authors also tested thyroid antibodies and found that 2 patients with no personal or family history of AA had elevated levels. Around 25% of patients who have 1 autoimmune condition have an increased tendency to develop further autoimmune diseases, and therefore this finding is to be expected.⁸

May Lee et al reported a further case which developed AA 1 week following vaccination.⁹ This patient had

no personal or family history of AA or autoimmune disease. While initially limited to the scalp and beard, after the second dose of the vaccine, the AA progressed to AT which was unresponsive to treatment. Rossi et al's case report described 3 cases who developed AA 2 to 3 weeks postvaccination.¹⁰ The hair loss was limited to the scalp and facial hair, and all 3 had a history of AA. Gallo et al's report describes a further case—symptoms, which started 3 weeks after the vaccination, were limited to the scalp and beard.¹¹ This patient had no personal history of AA or other autoimmune disorders, nor any family history of AA.

Essam et al's case occurred a few days after administration of the vaccine.¹² The patient had 1 previous episode of AA 6 years previously but had no family history of AA. The authors proposed molecular mimicry, resulting in the production of pathological autoantibodies, as a possible mechanism through which the vaccine could trigger AA. Bardazzi et al describe 3 cases, with the onset of symptoms being 1 to 2 weeks following vaccination.¹³ Two of the patients had a history of AA. One progressed to AT over the next 6 weeks, with no response to treatment. The other cases experienced mild AA with good response to treatment.

Postinfection

Eleven patients who developed AA following COVID-19 infection have been reported in the literature. Only 3 progressed to AT (2) or AU (1). The onset of AA following infection was between 2 and 4 weeks in most cases. Only 1 patient had a personal or family history of AA or autoimmune diseases, which contrasts with the patients who developed AA following COVID-19 vaccination, where 72% of them did.

Bardazzi et al's case series also described 3 cases of AA, 2 to 3 weeks after COVID-19 infection.¹³ The AA was patchy and limited to the scalp. None of the patients required hospitalization for COVID-19 and the AA had healed within 4 months of onset with topical corticosteroids. Rossi et al reported 1 case of AT, 1 month after COVID-19 infection which did not require hospitalization.¹⁴ There was no personal or family history of AA, autoimmune blood tests (such as ANA, ENA, thyroid, and celiac antibodies) were all normal, and the patient had a good response to treatment. The authors posited that, as AA can be triggered by physiological stress, stress on the body from the COVID-19 infection could be the trigger.

Sgubbi et al reported a case of AA limited to the scalp, beginning 1 week after COVID-19 infection.¹⁵ Once again, autoimmune blood tests were performed and came back negative, and there was no personal or family history of AA or autoimmune diseases. The patient took hydroxychloroquine (a controversial treatment for COVID-19 with no evidence base),¹⁶ and it was after this that the hair loss began. Hydroxychloroquine is not known to

trigger AA; indeed, it has been studied as a possible treatment for AA¹⁷ and is used as a treatment in other autoimmune conditions such as rheumatoid arthritis and systemic lupus erythematosus. The patient was prescribed topical clobetasol cream and there was response to the treatment.

Fivenson described 3 patients who developed AA following the beginning of the COVID-19 pandemic.¹⁸ Only 1 of the patients in the case report had a positive COVID-19 polymerase chain reaction test and was therefore confirmed to have been infected with COVID-19. In this patient's case, the AA progressed to AU and was unresponsive to treatment after 1 to 2 months. Capalbo et al described 1 patient who developed AA of the beard 1 month following COVID-19 infection.¹⁹ There was no personal or family history of AA or other autoimmune disorders. Routine blood tests were normal (although autoimmune markers were not performed) and there was improvement of the initial lesions after 2 weeks of topical treatment; however, new lesions subsequently appeared.

Berbert Ferreira et al reported a patient with a history of AT who had experienced complete hair regrowth on tofacitinib.²⁰ When she contracted COVID-19, tofacitinib was discontinued for 2 weeks and she subsequently developed anagen effluvium. Tofacitinib was restarted, but no improvement in the AT over the following 3 months was noted. The authors suggest that the lack of a response to the reintroduction of tofacitinib points towards an effect from the virus on the hair follicle, although the initial anagen effluvium may still have been triggered by the discontinuation of tofacitinib.

Hayran et al's case report describes 2 pediatric patients, 1 of whom developed a patch of AA on the scalp 1 month following COVID-19 infection with associated pediatric inflammatory multisystem syndrome.²¹ Pediatric inflammatory multisystem syndrome is a systemic inflammatory disease in children and is triggered following exposure to SARS-CoV-2. Although its pathophysiology is unclear, immune-mediated mechanisms have been proposed.²² Further, the patient had no personal history of AA or autoimmune disorders, nor was there a family history of AA. Temiz and Kutlu reported a further 2 patients who developed AA between 6 and 8 weeks following COVID-19 infection.²³ There was no information provided regarding the extent of the AA or the personal or family history of the patients.

Summary

There remains a question of causality, especially in the cases where the development of AA has been months after exposure. The incidence of AA is estimated at 20.9 in 100,000 person-years, with a cumulative lifetime incidence of 2.1%,²⁴ therefore some of the case reports may simply reflect baseline population incidence. Furthermore, as Fivenson suggested, the mental stress of the global

pandemic may have contributed to some of the cases, as stress has been recognized as a trigger for AA.¹⁸

Despite this, there is evidence that there may be a link between both the COVID infection and vaccinations and AA. Further study is needed to elucidate this possible link and improve treatments for patients affected by these phenomena. A fair discussion of AA as a risk of vaccination should be discussed with all recipients, as the psychological burden of AA should not be dismissed. Future research can be aided by accurate reporting of these cases by healthcare professionals.

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