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LETTER

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Subacute thyroiditis following COVID-19 vaccination: Case report and Society for Endocrinology survey

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To the Editor,

We report a case of subacute thyroiditis which developed following COVID-19 vaccination and 17 additional cases also presenting after COVID-19 vaccination.

A 52-year-old woman developed painful anterior neck swelling 7 days after receiving the first dose of COVID-19 vaccine AstraZeneca (AZ). After 4 days, she was seen by her GP who suspected thyroiditis. Blood tests showed TSH 0.14 mIU/L, CRP 34 mg/L (0–5) and TRAb 0.3 IU/L (0–0.9). A neck Doppler ultrasound scan on Day 15 showed heterogeneous features of thyroiditis with increased Doppler flow. On Day 21, she was hyperthyroid with TSH < 0.02 mIU/L and free T4 70.3 pmol/l (12–22). In the A&E Department, a COVID-19 test was negative and she was advised to start carbimazole 40 mg daily and propranolol but took only the beta-blocker. Seven weeks after vaccination, she felt well and her TSH was 0.86 mIU/L, having spontaneously normalized. In the Endocrine clinic during Week 9, she remained asymptomatic but was biochemically mildly hypothyroid with TSH 11 mIU/L and free T4 9 pmol/L, and by Week 18, her TSH had spontaneously normalized again. The diagnosis was subacute thyroiditis. She had no preceding history of thyroid disease; she was otherwise well and took no regular medication. She was concerned that COVID-19 vaccination had triggered her subacute thyroiditis.

Because of this case, we conducted an email survey through the Society for Endocrinology (SfE) asking Society members about their experience of subacute thyroiditis occurring in individuals within 28 days of administration of a COVID-19 vaccine. Seventeen cases fulfilling these criteria were reported to us (personal communication). Seven were from the United Kingdom, 14 reports were received from doctors and three were from patients. Eleven cases followed Pfizer-BioNTech mRNA vaccine, five followed AZ ChAdOx1 S (recombinant) vaccine and one occurred after Moderna mRNA vaccine. Nine cases of thyroiditis developed after the first dose of vaccine and eight after the second dose, with symptom onset a mean of 14.5 days after vaccination (range 1–28). On presentation, the median fT4 was 1.35 times upper limit of normal (29.6 pmol/L, results from normal up to >100 pmol/L, $n = 12$; RR 12–22). Median CRP was 60 mg/L (RR 0–5, $n = 9$) and median ESR 52 mm/h (RR 1–15, $n = 7$). Individual case details, where provided, ranged from mild self-limiting disease to those with severe symptoms where treatment with glucocorticoids was required.

A significant number of cases were reported in this SfE survey where there was a temporal association between COVID-19 vaccination and the onset of subacute thyroiditis. It appears possible that COVID-19 vaccines triggered subacute thyroiditis in these cases due to an autoimmune/inflammatory (ASIA) syndrome induced by the vaccine adjuvants. The adjuvants in Pfizer-BioNTech and Moderna mRNA vaccines comprise lipid nanoparticles that bolster immune responses. An alternative explanation may be that binding and endocytosis of the vaccine-generated spike S1 protein at membrane ACE2, expressed on the surface of thyroid cells, causes direct viral injury leading to thyroiditis.[1] Third, cross-reaction has been shown between SARS-CoV-2 spike protein antibody and thyroid peroxidase (TPO), which may cause thyroiditis by viral antigenic mimicry.[2]

Case reports and small case series of subacute thyroiditis following COVID-19 vaccination have recently been described.[3,4] Endocrinologists need to be aware of potential vaccine sequalae when managing thyrotoxic patients, including the heightened risk that thyrotoxicosis following COVID-19 vaccination will result from a potentially self-limiting subacute thyroiditis. It has also been reported that Graves' disease can

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develop shortly following COVID-19 vaccination.[5] With billions of COVID-19 vaccine doses administered to date, and a background subacute thyroiditis incidence of 4.9 per 100,000, there remains a caveat that the cases in our survey may have arisen by chance. However, SARS-CoV-2 vaccines were developed under emergency conditions and the original clinical trials exceptionally consisted of simultaneous phases 1, 2 and 3. Furthermore, the individuals in the placebo arms of the trials have been offered the vaccine, thus randomized control groups do not exist. Systematic monitoring of the general population has not occurred so potential side effects may have been overlooked. Clinicians managing diseases other than COVID-19 do not usually document the COVID-19 vaccination history. Accordingly, a possible link may easily be missed, and adverse effects underestimated.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

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

REFERENCES

1. Li MY, Li L, Zhang Y, Wang XS. Expression of the SARS-CoV-2 cell receptor gene ACE2 in a wide variety of human tissues. *Infect Dis Poverty*. 2020;9(1):45. doi:10.1186/s40249-020-00662-x
2. Vojdani A, Kharrazian D. Potential antigenic cross-reactivity between SARS-CoV-2 and human tissue with a possible link to an increase in autoimmune diseases. *Clin Immunol*. 2020;217:108480. doi:10.1016/j.clim.2020.108480
3. Iremli BG, Sendur SN, Ünlütürk U. Three cases of subacute thyroiditis following SARS-CoV-2 vaccine: postvaccination ASIA syndrome. *J Clin Endocrinol Metab*. 2021;106(9):2600-2605. doi:10.1210/clinem/dgab373
4. Ratnayake GM, Dworakowska D, Grossman AB. Can COVID-19 immunisation cause subacute thyroiditis? *Clin Endocrinol*. 2021:1-2. doi:10.1111/cen.14555
5. Vera-Lastra O, Ordinola Navarro A, Cruz Domiguez MP, Medina G, Sánchez Valadez TI, Jara LJ. Two cases of Graves' disease following SARS-CoV-2 vaccination: an autoimmune/inflammatory syndrome induced by adjuvants. *Thyroid*. 2021;31:1-4. doi:10.1089/thy.2021.0142

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