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Subacute thyroiditis after receiving inactivated virus vaccine for COVID-19

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Subacute Thyroiditis After Receiving Inactivated Virus Vaccine for COVID-19

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Abstract

The spread of SARS-COVID 19 infection has resulted in accelerated efforts at development and dissemination of vaccines throughout the globe. These vaccines have different mechanisms of actions and their efficacy and side effects are being monitored. There have been rare reports in literature of thyroid dysfunction after COVID-19 vaccine administration. Sub-acute thyroiditis is one such complication which can arise as a rare side-effect of vaccination. This has also been reported as a symptom of COVID-19 infection. Clinical features include fever, neck pain, palpitations and weight loss. We report sub-acute thyroiditis in a 50-year-old male who presented with symptoms suggestive of thyroid abnormality one day after receiving the inactivated COVID-19 vaccine (CoronaVac Sinovac-Biotech Ltd).

Keywords: Subacute thyroiditis, COVID-19, Vaccine

1. Introduction

COVID-19 pandemic has been a major disruptive event of the 21st century having negative implications for people's health and multiple facets of everyday life. At the same time, it has been a challenge for medical professionals to deal with the unique manifestations of this novel disease. The rapid development of vaccines has served to stem the tide in the pandemic, and many different types are being used throughout the globe with an acceptable safety and efficacy profile. These include inactivated virus (Sinopharm, Sinovac), adenovirus vectored (Oxford-Astrazeneca, Sputnik) and mRNA vaccines (Pfizer-BioNTech, Moderna).¹ The COVID-19 vaccines have predominantly minor side effects including fatigue, headache, fever and injection site soreness.² However, in rare instances major side effects involving endocrine glands may occur with thyrotoxicosis, thyroiditis and hypophysitis being recently reported in literature as very rare side

effects.^{3,4} There is presence of adjuvants in the vaccine which are used to increase the effectiveness of the host's immune response.⁵ Sub-acute thyroiditis is an inflammatory condition of the thyroid gland which is associated with local neck pain and systemic symptoms, and is usually self-limited. It has been reported as a side effect after administration of many viral vaccines which include H1N1, influenza and hepatitis B vaccines.⁶⁻⁸ However, there is a paucity of literature on post COVID-19 vaccination induced subacute thyroiditis, and there are only a few reports documenting this phenomenon.⁹ We present a case of a 50-year-old male who presented with features consistent with sub-acute thyroiditis after receiving the inactivated COVID-19 vaccine (CoronaVac Sinovac-Biotech Ltd). The aim of this article is to contribute to the existing literature regarding the safety profile of the COVID-19 vaccines and awareness about rare side effects of these vaccines.

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2. Case presentation

A 50-year-old man presented to the outpatient department with complaints of fever, throat pain, palpitations, and fatigue for the past 12 days. The patient had received the second dose of the inactivated COVID-19 vaccine (CoronaVac Sinovac-Biotech Ltd). The fever was low grade and associated with anterior neck pain which was localized over the right side of the thyroid gland and radiated to the jaw. The patient also had a 2 kg weight loss in these 12 days and had suffered from fatigue. About four weeks prior to receiving the second vaccine dose the patient received his first dose and had subsequently developed fever, throat discomfort and fatigue within 12 h. These symptoms self-resolved after three days. On physical examination, his temperature was 37.2 °C, pulse was 92/min, blood pressure was 135/80 mmHg and there was tenderness over the thyroid gland. There was no tremor or sweating.

His past medical history was significant for chronic Hepatitis B infection for the past 6 years for which he was taking the anti-viral drug Tenofovir. The patient was not suffering from an active upper respiratory or COVID-19 infection which was confirmed by a negative COVID-19 PCR test. The patient had no history of autoimmune or thyroid disease and had never suffered from COVID-19 infection. Family history was significant for hypertension in his mother. There was no family history of autoimmune or thyroid disorders.

His lab investigations on the day of presentation (Table 1) revealed abnormal thyroid function tests with reduced TSH and slightly increased T3 levels. The anti-thyroglobulin and anti-thyroid peroxidase antibodies were also positive. He had an elevated white cell count in addition to the deranged thyroid function tests. BMP, lipid profile and LFTs were within normal range. The patient's TLC count was raised. The thyroid ultrasound scan showed an enlarged right lobe of the thyroid gland with multiple hypoechoic nodules and increased vascularity

Table 1. Laboratory investigations.

Parameter	Result	Units	Reference values
Total T3	0.5	ng/mL	0.6–1.6
Free T4	1.1	ng/dL	0.7–1.5
TSH	0.01	uIU/mL	0.4–4.5
Anti Thyroglobulin Abs	11.2	IU/mL	Negative: <4.1
Anti-TPO (Th. microsomal)	10.1	IU/mL	Negative: <5.61
TSH receptor Ab	0.80	IU/L	Negative: = /<1.0 Equivocal: 1.1–1.5 Positive: >1.5
CRP quantitative	0.04	mg/dL	Negative: <0.5 Positive: >0.5
WBC count	14210	/cmm	4-10k/cmm

shown on color flow. Technetium-99m thyroid scan was then carried out which revealed an increase in the size of the thyroid gland with reduced and patchy tracer uptake and these findings reflected subacute thyroiditis (Fig. 1).

The patient was prescribed propranolol to control palpitations and paracetamol for neck pain and fever. The patient's symptoms improved over the next few weeks and there was no further weight loss. After four weeks his thyroid function tests revealed persistently decreased TSH but normal levels of free T4 and T3.

3. Discussion

COVID 19 pandemic has increased strain on healthcare setups throughout the world. However, efforts directed by scientific community have yielded various vaccines which are being administered globally. The vaccines have been instrumental in reducing deaths and hospitalizations.¹⁰ Different types include mRNA, adenovirus vector and inactivated whole virus vaccines.¹¹ Inactivated vaccines like CoronaVac (manufactured by Sinovac Biotech Ltd) and BBIBP-CorV (made by Sinopharm) have been the mainstay of vaccination effort in low to middle income countries.¹² Mild to moderate adverse effects reported with these vaccines which predominantly include local injection site pain, fever, headache, fatigue and mucocutaneous eruption¹³ According to a study, at least 74% of the people experienced one minor side-effect post vaccination.¹⁴ Local side-effects were the most common according to another study, with systemic side-effects more prevalent in people who had suffered from COVID-19 infection previously.¹⁵

Subacute thyroiditis is known as the most common cause of painful thyroiditis. The exact etiology is ambiguous but is thought to be most likely due to viral infection. The clinical features include severe pain (which may radiate to the jaw) and swelling over the anterior neck, thyroid gland tenderness, fever, malaise, palpitations and weight loss. Laboratory investigations show decreased TSH, elevated ESR, CRP and thyroglobulin levels. Imaging modalities include thyroid ultrasound and radioiodine uptake which show hypoechoic or anechoic lesions and low thyroid uptake of radioiodine respectively. Technetium-99 nuclear scans may show reduced tracer uptake. Initial thyrotoxic clinical picture may be followed by hypothyroid symptoms due to depletion of thyroid stores.¹⁶ The condition however is self-limiting with majority of patients returning to euthyroid state within 6–12 months. Treatment of the condition is mainly supportive, aimed at

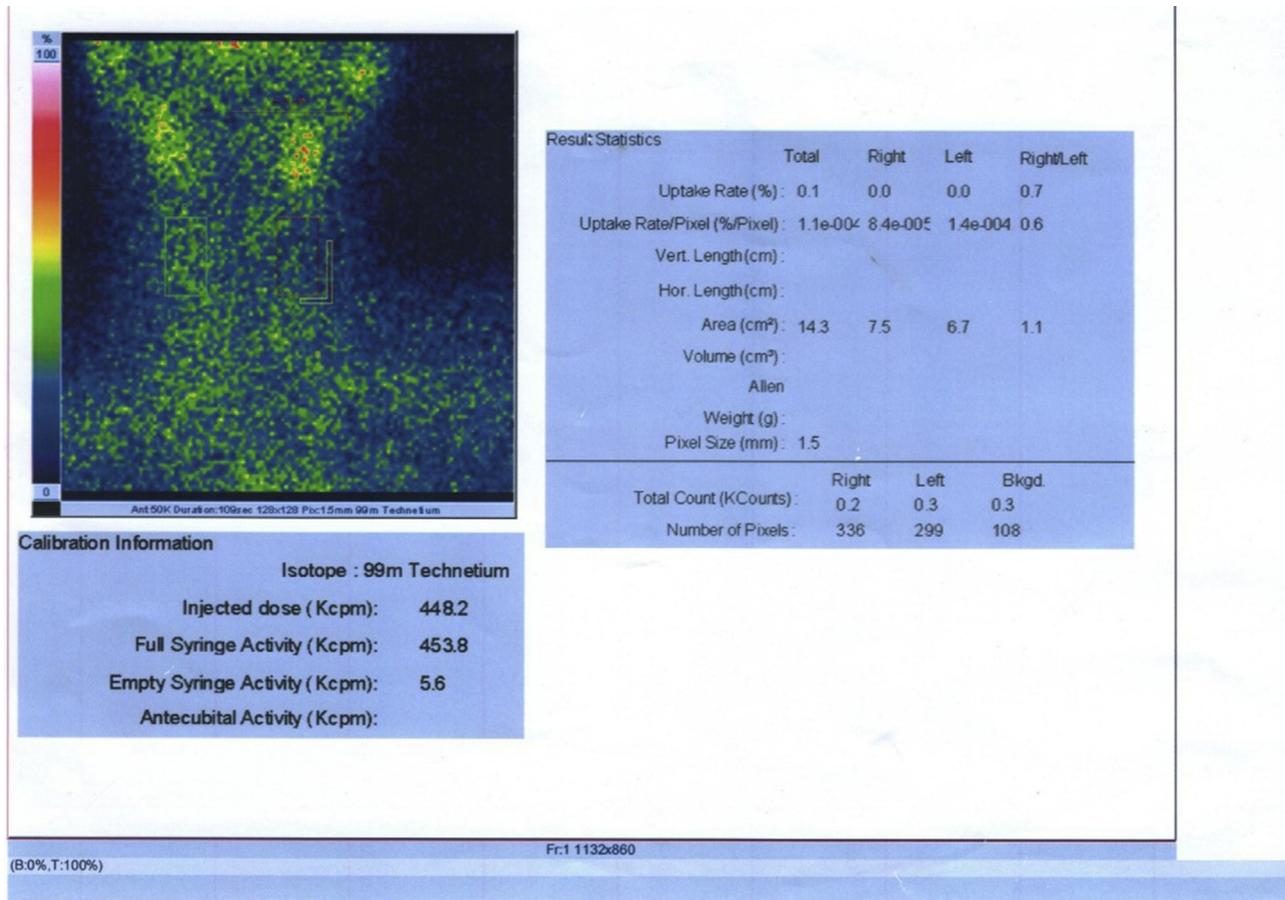


Fig. 1. Technetium-99m scan showing reduced tracer uptake in the thyroid gland.

reducing pain and preventing symptoms of hyper/hypothyroidism. NSAIDs or salicylates are used to relieve pain. Severe forms of the disease may warrant corticosteroid therapy.¹⁷

Subacute thyroiditis has been reported as a rare manifestation of COVID-19 infection.¹⁸ There have also been cases of thyroid dysfunction post COVID-19 vaccination. Development of subacute thyroiditis was reported in three female patients who had undergone vaccination from the inactivated CoronaVac vaccine.¹⁹ There is also a case of a female patient developing subacute thyroiditis after getting an mRNA vaccine for COVID-19 (Pfizer/BioNTech),²⁰ and another case of a female patient developing subacute thyroiditis after vaccination from the adenovirus-vectored COVID-19 vaccine (Oxford-AstraZeneca). Anti-thyroid antibodies have been positive in just one case of post COVID vaccination sub-acute thyroiditis reported prior to our case, with the anti-thyroglobulin antibody being positive in the patient who had received the adenovirus-vectored (Oxford-AstraZeneca) vaccine.²¹

The pathophysiology of thyroid abnormalities after COVID-19 vaccination is unclear. It is believed

to be a result of autoimmune and inflammatory reaction to the adjuvants used in the vaccine.²² The adjuvants used include aluminum hydroxide and viral antigens, and serve to boost immune response to the vaccine. But they can play a role in precipitating ASIA syndrome (autoimmune/inflammatory syndrome induced by adjuvants). This may result from disturbance of the host's immune system equilibrium and molecular mimicry. The adjuvants are used to improve the immunogenicity of the vaccines, but they can lead to antibody production and inflammation. The reaction of the body to adjuvants leads to B-cell activation, changes in the host environment and rapid progression of molecular mimicry. The systemic inflammatory condition induced in the body as a result has rarely led to endocrine gland dysfunction in the form of thyroiditis, autoimmune diabetes, adrenal and ovarian insufficiency.²³ As per available literature, a majority of the cases of sub-acute thyroiditis after COVID-19 vaccination had onset of symptoms within a few days of the administration of vaccine. This can be due to the fact that viral proteins reach their maximum level a few days after inoculation

and induce an autoimmune response.²⁴ Our patient had onset of symptoms 1 day after administration of the second dose of the vaccine and didn't suffer from any acute upper respiratory viral ailment or COVID-19 in the days preceding the onset of symptoms. No other case of thyroiditis post-vaccination by any type of COVID-19 vaccine has been reported in literature in Pakistan since the launch of the vaccination drive in February 2021. Sub-acute thyroiditis after COVID-19 vaccination remains a rare side effect which merits further investigation to explore interplay of multiple factors involved in manifestation of this clinical entity.

Disclosure statement

The authors declare no conflict of interest.

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