



## A Case of Telogen Effluvium as COVID Sequelae

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**Received:** March 15, 2022

**Published:** April 29, 2022

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### Abstract

Telogen effluvium (TE) is a reversible form of hair loss which is an identified sequela of COVID-19 infection. Generally diagnosed by a hair-pull test or a modified wash test, it can cause a non-scarring shedding of hair for months after the resolution of COVID-19. The pathophysiology of TE secondary to COVID-19 is still being understood. Here, we describe a 45-year-old unvaccinated female who was diagnosed with a severe case of telogen effluvium approximately 3 months after her COVID-19 diagnosis, with hair loss that exceeded 80% of her total hair.

**Keywords:** Telogen Effluvium; COVID 19; Hair Loss

### Introduction

Covid-19 infection is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and results in an upper respiratory tract infection that can progress to acute respiratory distress syndrome (ARDS), cardiac injury, acute kidney injury, septic shock and organ failure. The pathogenesis is unknown, but the clinical manifestations are believed to result from immune system dysregulation. Viral infection of pulmonary epithelium induces local inflammatory responses and promotes the release of cytokines, a key factor in ARDS and extrapulmonary organ failure [1].

As more information is uncovered about the virus, clinical manifestations and post infectious sequelae are becoming more apparent with time. Telogen effluvium (TE) is a recently identified sequelae of Covid-19 and multiple studies have demonstrated this association [2-5]. Telogen effluvium is a scalp disorder character-

ized by diffuse, non-scarring shedding of the hair 2-3 months after a stressor. There are three types of TE. In type 1 TE, the cadherins are broken down by proteolysis resulting in the release of the exogenous hair, which can be precipitated by endogenous causes of any local inflammatory process. Type 2 TE encompasses a synchronization of hair cycles which leads to a molt-like shedding, which is common in neonates, postpartum women and those taking oral contraceptive pills. Type 3 TE results from premature entry into the telogen phase, possibly in response to drugs, nutritional deficiencies or autoimmune activity [6].

Telogen effluvium is classified based on its chronicity. Acute cases typically resolve within 6 months but chronic cases lasting longer than 6 months are also present. Some patients may also experience trichodynia, a painful sensation that accompanies the hair loss, along with the psychological consequences of hair loss like de-

pression, anxiety and stress [6]. Recent studies have suggested that chronic TE may be associated with Taq1 and Cdx Vitamin D Receptor gene polymorphism, possibly due to slower anagen growth and hair follicle stem cell proliferation [7].

Treatment for TE relies on addressing the underlying cause. Vitamin D, vitamin C and iron supplementation has been suggested [6]. For those with TE secondary to Covid-19, there is no gold standard of treatment. Some studies also suggest that Covid-19 related TE may progress differently. Factors such as hypoxia, inflammation, metabolic abnormalities, medications, and mechanical ventilation could play a role in the development and severity of TE secondary to COVID-19 [2]. COVID-19 increases the risk of arterial and venous thrombosis resulting in inflammation, endothelial dysfunction, platelet activation and blood stasis [8]. This may be related to type 1 TE which is precipitated by endogenous inflammatory causes. Furthermore, the polymorphism in the vitamin D receptor may also be linked to COVID-19, since vitamin D is known to have immunomodulatory effects and effectiveness against various upper respiratory infections [8]. Unfortunately, research regarding the association between TE and Covid-19 is limited. Therefore, the purpose of this case report is to present a case of Covid-19 related TE and discuss their relationship.

### Case

The patient is a 45-year-old unvaccinated Caucasian female with a past medical history of migraines who presented virtually after she was positive for COVID via a PCR on 8/26/2021. Her symptoms for COVID began on 8/24/2021, which involved a cough, nausea, and emesis. She did not experience any fever and had an O<sub>2</sub> saturation of 97% at home. She remained home in isolation and was treated symptomatically. The patient was never hospitalized and was not a candidate for monoclonal antibody therapy. Eventually, her symptoms self-resolved.

The patient was seen again on 11/16/2021 with a concern for hair loss of 2-weeks in duration. The patient exclaimed during the appointment that she had been losing large clumps of hair 2-3 times a day. Her hair loss was causing her tremendous anxiety.

Due to the patient's concerns, thyroid function tests and thyroid antibodies were ordered. Additional labs were drawn, including an antinuclear antibody screen, prolactin, luteinizing hormone, and

dehydroepiandrosterone levels. Initially, there was a suspicion that her hair loss may have been secondary to an endocrine disorder, and she was also referred to endocrinology as a result.

Her blood work was carried out as shown in Table 1, and the only abnormality was her thyroid microsomal antibody: 14.35 (normal <5.61). During her endocrinology appointment, it was noted that the patient was supplementing with biotin, which was held prior to repeating her thyroid studies. Her repeated thyroid-stimulating hormone remained normal at 0.59. Additionally, a testosterone level was performed, which was found to be at 29 (9-55 ng/dL). The patient had a history of vitamin D deficiency of 15.7 ng/mL, and supplementation was started. The patient was subsequently referred to dermatology due to no obvious endocrine abnormality.

The patient presented to the dermatologist on 11/24/2021. Her hair loss had not improved at the time. During the physical examination, the patient was found to have severe hair loss of 80%, and she had a positive hair pull test. As a result, she was diagnosed with telogen effluvium, thought to be likely secondary to COVID-19 infection in August due to the extent of the patient's hair loss, along with presenting within 3 months of COVID.

Even though she had vitamin D deficiency, it was deemed less likely to be the cause of her severe hair loss. The patient was educated on the findings and given the option of topical minoxidil, which she refused. On a follow-up on 2/15/2022, the patient noted that her hair was growing back.

### Discussion

In our case, the patient had severe hair loss which was preceded by a COVID-19 infection. The patient also had positive thyroid microsomal antibodies, but her titers were low. As a result, it is unlikely that she had telogen effluvium secondary to an autoimmune cause.

The pathophysiology of COVID-related TE is still under investigation. However, elevated interleukin-6 levels, interferon, metalloproteinases 1/3, interleukin 1B, direct damage to hair follicles, medications in the treatment of COVID, and microthrombi formation due to suppression of anticoagulation proteins have all been proposed as potential players in the pathophysiology of COVID-19 related telogen effluvium [9].

Date	Order	Result	Normal Range
08/06/21	25-OH Vit D	15.7 ng/mL	30-80ng/mL
11/16/21	Prolactin	11.50 ng/mL	5.20 - 26.50 ng/mL
11/16/21	LH	3.30 mIU/mL	Follicular: 1.8-11.8 mIU/mL, Mid-cycle: 7.6-89.1 mIU/mL, Luteal: 0.5-14.0 mIU/mL
11/16/21	DHEA	3.634 ng/mL	0.630-4.700 ng/mL
11/16/21	T3	2.8 pg/mL	2.5-4.5 pg/mL
11/16/21	T4	0.91 ng/mL	0.70-1.70
11/16/21	Thyroid Microsomal Antibody	14.35 IUunits/mL	<5.61
11/16/21	TSH	0.82 mIU/mL	0.36-3.74 mIU/mL
11/16/21	TSH Receptor Antibody	<0.90 IUunits/L	0.70-1.70 IUunits/L
11/16/21	Antinuclear Antibody Screen	Negative	Negative
11/16/21	CRP	0.3 mg/dL	<0.9mg/dL
11/16/21	WBC	7 K/uL	4.0-10.0 K/uL
11/16/21	Hgb	14.0 gm/dL	12.0-16.0 gm/dL
11/16/21	Hct	44.8%	36.0-47.0 %
11/16/21	Platelet	357 K/mcL	150-400 K/mcL
11/22/21	ESR	13 mm/hr	1-20 mm/hr
11/22/21	TSH	0.59 mIU/mL	0.36-3.74 mIU/mL
11/22/21	T4	0.99 ng/dL	0.70-1.70 ng/dL
11/22/21	T3	0.98 ng/mL	0.58-1.59 ng/dL
11/22/21	Testosterone	29 ng/dL	9-55 ng/dL
02/02/22	25-OH-Vitamin D	36.5 ng/dL	30-80 ng/mL

**Table 1:** Laboratory results.

Telogen effluvium has been observed during the post-COVID sequelae, with studies citing the incidence as high as 27.9% after ruling out other causes [10]. Drugs, trauma, and emotional/physiological stress can all contribute towards developing telogen effluvium.

Autoimmune/inflammatory telogen effluvium is a subtype of TE. Patients present often as an observed triad of trichodynia, autoimmunity (often Hashimoto thyroiditis), and improvement with topical corticosteroids [11].

Anti-thyroid peroxidase antibodies and Hashimoto's may be associated with 60% of cases. Other commonly related autoimmune conditions include Sjogren's, Crohn's Disease/Ulcerative Colitis, other autoimmune thyroid conditions, and autoimmune atrophic gastritis [12]. Based on the literature thus far, autoimmune phenomena is not a proposed mechanism by which COVID causes TE [13].

On average, TE occurs 53.76 days after RT-PCR positivity, with a range of 2-12 weeks after the COVID-19 infection. It is also seen significantly more in women, with some studies showing a 42.3% incidence in females compared to 6.2% in males [10]. This holds true for acute telogen effluvium not associated with COVID as well. Females also tend to have longer hair, which is easier to observe upon shedding [12].

Although various treatment modalities have been proposed for telogen effluvium associated with COVID-19, case reports have shown that it is a self-limiting sequela and expected to resolve without any treatment. As depression and anxiety have an association with telogen effluvium, properly educating patients and a thorough workup are paramount [13]. Educating patients on the diagnosis, including its reversible nature, can help alleviate significant stress [14]. Stress during infection with COVID-19 has also been seen as a potential contributor to hair shedding. Comorbidities such as dyslipidemia, hypertension, and diabetes mellitus are also implicated in COVID-19 associated TE, along with the severity of illness [12].

### Conclusion

Currently, the knowledge of COVID and its post-COVID sequelae is expanding. Telogen effluvium as a consequence of a COVID-19 illness is one such example. The diagnosis can pose challenges, and thyroid, Vitamin D levels, along with ruling out anemia should help rule out any other causes or confounders in diagnosing telogen effluvium secondary to COVID. A modified wash test or pull test during the encounter can help to confirm the diagnosis of telogen effluvium. Generally, educating patients on the diagnosis can help alleviate the anxiety and depression associated with the patient's significant hair loss.

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