

COVID CONCEPTS

Telogen Effluvium in Patients Recovering from COVID-19

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ABSTRACT

Background: We characterized and summarized clinical and demographic features in patients with post-COVID 19 Telogen Effluvium and compared it with those reported in the literature.

Methods: We collected data from 10 participants and measured average onset of TE from initial COVID-19 symptoms, medical intervention for COVID-19 infection, physical exam findings, and whether or not patient experienced resolution of TE symptoms after 14 weeks. We performed a literature review using the terms “telogen effluvium”, “covid” and “hair” and investigation was limited to adult case reports and cohort studies appearing in the English-Language literature as of March 2021. Clinical and demographic findings were analyzed and compared with those of our patient cohort.

Results: Nine out of ten patients in our cohort had mild COVID-19 symptoms only with mean onset of hair shedding was 73 days following infection. None had previous history of hair loss. By contrast, of the 28 patients identified in the literature review 50% of these patients were hospitalized for severe COVID-19 infection with average onset of TE 87 day after infection. 12% of these patients had pre-existing androgenic alopecia.

Conclusion: Telogen Effluvium is a distressing, yet self-limited condition that can occur following both mild and severe COVID-19 infection. Dermatologists should expect an increase in TE in areas heavily affected by COVID-19 and reassure patients of the likely cause and that symptoms will resolve over time.

INTRODUCTION

Telogen Effluvium (TE) is a non-scarring alopecia characterized by diffuse hair shedding that has recently been reported as a post-infectious manifestation of the novel coronavirus SARS-CoV-2.¹ In response to physiological or psychological stress, premature termination of the anagen phase and subsequent transition to the telogen phase of hair growth result in shedding of hair follicles 2-3 months after the

precipitating event. The condition is usually self-limited, with acute cases resolving within 6 months of onset.² It has been proposed that proinflammatory cytokines, impaired anti-coagulation and severe psychosocial stress of COVID-19 triggers TE in survivors recovering from the disease.³ We describe ten cases of a telogen effluvium following COVID-19 infection from an ambulatory dermatology clinic in New York City, an early epicenter of the pandemic and review the current literature.

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METHODS

For the literature review portion, a PubMed search was conducted with the following terms, “telogen effluvium”, “covid” and “hair” without any Boolean operators and investigation was limited to adult case reports and cohort studies appearing in the English-Language literature as of March 2021. Articles wherein the full text was not available or of an irrelevant publication type such as literature reviews, conference abstracts, posters, and editorials were excluded. Out of the eleven results, three did not match the publication type and three were not descriptive case reports. In total, five publications with reported cases of post COVID-19 TE were included in the study.

RESULTS

We report 10 patients who developed acute, new onset TE weeks after COVID-19 infection. Patient demographics and clinical features are summarized in Table 1. The patients ranged from 20 to 68 years old with a median age of 56 years and were 60% female. All patients had PCR or antibody confirmed COVID-19 infection and denied previous history of hair loss. No new medical conditions, medications, or lifestyle modifications aside from COVID-19 were reported. Only one patient was hospitalized for a severe COVID-19 infection that lasted 40 days and required 21 days of mechanical ventilation. The other nine patients exhibited mild symptoms limited to anosmia, congestion, cough, fatigue, fever, headache, lethargy, myalgias, nausea, progressive weakness, and shortness of breath that were treated in an outpatient setting. The mean duration of COVID-19 symptoms in these 9 patients was 9.89 days. The most common treatment for COVID-19 infection

was acetaminophen (60%) followed by azithromycin (40%) and hydroxychloroquine (20%).

Overall, the average onset of hair shedding was 73 days after initial COVID-19 symptoms. The most common pattern of hair loss was diffuse hair thinning (80%) followed by bitemporal recession and thinning (50%). While over the counter minoxidil solution or foam was recommended to four of the patients, most did not receive any further treatment. At 14-week follow-up, 50% of the patients' hair complaints had resolved.

A total of 28 patients with TE following laboratory confirmed COVID-19 infection were identified across five retrospective studies, case reports, and case series. Data analysis including patient demographics, medical intervention for COVID-19, duration of illness, time between COVID-19 infection and onset of hair loss, physical exam findings, treatment for telogen effluvium, and outcomes are summarized in Tables 2 and 3. Half of the patients who developed TE were hospitalized for treatment of severe COVID-19, while 35.7% of the patients experienced mild to moderate symptoms only. The average time between COVID-19 infection and onset of TE was 87 days with a standard deviation of 48 days. Most patients (82.1%) did not have any previous history of hair loss, while all others had a history of androgenic alopecia (AGA) or female pattern androgenic alopecia (FAGA).

DISCUSSION

The time between the stressor and onset of hair loss in Telogen Effluvium is equivalent to the length of the telogen phase, or approximately 3 months.^{2,3} Consistent with this, the patients reported in

Table 1. Summary of Patients with COVID-19 induced Telogen Effluvium

Age (years)	20	26	28	32	56	56	58	61	63	68
Gender	Female	Male	Female	Female	Female	Male	Female	Male	Female	Male
Race	White	White	White	White	White	Unspecified	White	White	White	Unspecified
Comorbidities	None	None	None	None	HTN	HTN HLD	None	HTN HLD DM	None	HTN
COVID-19 symptoms	Congestion Cough Fatigue	Anosmia Cough Fever	Fatigue Fever Headache	Anosmia Cough Fatigue Fever Myalgias Nausea Progressive weakness SOB	Congestion Cough Fatigue Fever Lethargy SOB	Anosmia Cough Fatigue Fever Nausea SOB	Cough Fever Myalgias SOB	Cough Fatigue Fever Myalgias SOB	Anosmia Diarrhea Fatigue Fever Progressive weakness SOB	Cough Fatigue Fever SOB
Disposition	OP	OP	OP	OP	OP	OP	OP	INPT	OP	OP
Medical Intervention for COVID-19	Albuterol ICS	None	APAP	APAP	APAP AZM	APAP IBP	APAP AZM	AZM HCQ MV	AZM HCQ	APAP
Duration of illness (days)	7	5	7	8	21	10	8	40	7	16
Days between COVID-19 infection and telogen onset	84	70	84	84	105	56	21	28	112	84
Physical exam findings	Bitemporal recession Diffuse hair thinning Positive telogen hair pull test Microscopy	Temporal hair thinning	Diffuse hair thinning throughout	Diffuse hair thinning throughout	Bitemporal recession Diffuse hair thinning Positive telogen hair pull test microscopy	Left sided temporal hair thinning	Diffuse hair thinning	Diffuse hair thinning	Diffuse hair thinning	Bitemporal recession, diffuse hair loss
Treatment for Telogen Effluvium	Minoxidil 5% solution	None	Minoxidil 5% solution	Minoxidil 5% solution	None	None	Minoxidil 5% foam	None	None	None
Outcome*	Resolved	Unresolved	Resolved	Resolved	Unresolved	Resolved	Unresolved	Unresolved	Unresolved	Resolved

APAP= Acetaminophen, AZM= Azithromycin, DM= Diabetes Mellitus, HCQ= Hydroxychloroquine, HLD= Hyperlipidemia, HTN= Hypertension, IBP= Ibuprofen, ICS= Inhaled corticosteroids, INPT= Inpatient, MV= Mechanical ventilation, OP= Outpatient, *Outcome measured at 14 weeks

this case series developed hair loss on average 73 days after infection with COVID-19. Other reported cases of post COVID-19 Telogen Effluvium presented with similar timing. Common causes of TE include medications, physiological stress, medical conditions, and metabolic imbalances.² Associations between acute TE and severe viral infections such as Dengue, human immunodeficiency virus, and influenza have been previously reported, although the mechanism by which this occurs is largely unknown.⁴⁻⁶ Proposed mechanisms range from primary follicle infection by causal virus to metabolic disturbances in hair follicle cells.^{4,5} Given the consistency in timing and presentation of our patients and those

reported in the literature, it may be inferred that there is a correlation between COVID-19 infection and the development of TE.

While the mechanism behind TE in patients infected by COVID-19 has not yet been elucidated, Olds H et. al. proposed that the combination of increased proinflammatory cytokines and consumption of anticoagulant proteins observed in severe COVID-19 infection lead to systemic inflammation and microthrombi formation, leading to occlusion of arterial hair supply.³ This proposal was made to explain TE in severe cases of COVID-19, where most patients were hospitalized.³ Nearly half of the patients that developed TE, as identified in our review,

were similarly hospitalized for serious COVID-19 infections.

Table 2. Reported Cases of Post COVID-19 TE: Summary of Patient Demographics

Total number of Patients with confirmed post COVID-19 TE	28
Age (years), mean ± SD	52.1 ± 15.0
Gender, n (%)	
Female	27 (96.4%)
Male	1 (3.6%)
Race, n (%)	
White	7 (25.0%)
Black	6 (21.4%)
Middle Eastern	1 (3.6%)
Unspecified	14 (50.0%)
Disposition, n (%)	
Patient Hospitalized, n (%)	14 (50.0%)
Outpatient	10 (35.7%)
Unspecified	4 (14.3%)
Medical Intervention for COVID 19, n (%)	
Azithromycin	6 (21.4%)
Ceftriaxone	5 (17.9%)
Doxycycline	2 (7.1%)
Other antibiotics*	3 (10.7%)
Hydroxychloroquine	7 (29.2%)
Oral Corticosteroids	3 (10.7%)
Enoxaparin and lopinavir/ritonavir	3 (10.7%)
Chlorphenamine	1 (3.57%)
Tocilizumab	1 (3.57%)
Supportive	2 (7.1%)
None	7 (29.2%)
Unspecified	4 (14.3%)

SD= standard deviation, *Not specified by authors

However, the majority of the TE patients described in this case series experienced mild COVID-19 symptoms.

Although hospitalizations and serious illness are known causes of telogen effluvium, mild-to-moderate illness not requiring extensive medical intervention does not usually cause notable hair loss. Proteomic analysis comparing the serum of patients with active COVID-19 infections compared to healthy donors identified significant changes in inflammatory cytokines (e.g., CXCL6) and proteins associated with immune cell activation (e.g., CD244 and CD40) between the two groups.⁸ In comparison, proteomic expression mild and severe COVID-19 patients do not demonstrate the same variability, implying high immune activation

even in mildly symptomatic patients. As TE can be caused by a surge of inflammation, increased severity of COVID-19 infection does not necessarily correlate with increased risk for developing postinfectious TE. Literature on dengue fever associated TE similarly found no association between severity of infection and hair loss.^{3,9}

Additionally, coagulopathy studies of COVID-19 patients revealed coagulation functions remained fairly stable in mild COVID-19 and not significantly different from baseline (convalescent state) within the same individuals.¹⁰ The presence of TE in mild COVID-19 patients may suggest that elevated inflammatory cytokines play a larger role in the accelerated transition from anagen to telogen phase. The theory proposed by Olds H et. al. of arterial hair supply occlusion by microthrombi secondary to a hypercoagulable state⁷ may not be as contributory to the development of TE in Covid patients.

TE induced by azithromycin, hydroxychloroquine or other medications used to treat COVID-19 should be considered in these cases, though this association has not been previously reported. It should be noted that anticoagulants such as heparin have been implicated as a trigger for TE, and all three patients reported by Rizzetto et. al. were treated with enoxaparin during their hospitalization which could confound causal analysis.¹¹ Patients with pre-existing TE have reportedly experienced worsened hair loss associated with the increased psychosocial stress induced by mandated quarantine. Psychological and emotional stressors are a known trigger for TE, so they may contribute to the new onset TE seen in COVID-19 patients. As our sample size is limited, we are unable to definitively determine a causal relationship between COVID infection and TE.

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Table 3. Reported Cases of Post COVID-19 TE: Summary of Clinical findings

Onset of TE Related to COVID-19 Infection	
Mean (days) ± SD	87.1 ± 47.7
Range (days)	(21, 210)
History of Hair Loss, n (%)	
AGA	1 (3.6%)
FAGA	4 (14.3%)
None	23 (82.1%)
TE Physical Exam Findings, n (%)	
Positive Telogen Hair Pull Test	10 (35.7%)
Increased Shedding	7 (25.0%)
Diffuse hair thinning	10 (35.7%)

AGA= Androgenic Alopecia, FAGA= Female Androgenic Alopecia, SD= standard deviation

Though the consistent timing of TE after recovery and the numerous case reports cited may suggest such a relationship exists.

CONCLUSION

Previous studies report that most cases of COVID-19-related TE occur in patients with severe infections, our investigation demonstrates that this phenomenon may also occur in mild to moderate cases of COVID-19. This is of particular relevance for dermatologists practicing in communities greatly affected by COVID-19, as they should expect to see a directly correlated increase in telogen effluvium cases in the months to follow. Patients should be educated on the increasing evidence of a causal link between TE and COVID-19 infection as well as reassurance regarding the self-limiting nature of the disease. The link between telogen effluvium and COVID-19 is still under evaluation, and further studies are needed to identify a causal relationship.

Conflict of Interest Disclosures: None

Funding: None

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