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Case report

ACUTE TELOGEN EFFLUVIUM FOLLOWING SARS-COV-2 INFECTION: A RARE PEDIATRIC CASE

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Abstract

Telogen effluvium is a temporary, non-scarring form of diffuse hair loss, characterized by a shortened anagen phase and increased telogen club hair shedding. It can appear three months after a stressful event and may last up to six months. Various factors, including the SARS-CoV-2 virus seen during the COVID-19 pandemic, can contribute to the onset of telogen effluvium. The exact pathophysiological mechanism of hair loss caused by the virus remains unclear and continues to be under investigation. Telogen effluvium following COVID-19 has been frequently described in adults; however, there are few published cases in children. We present a rare case of post-COVID-19 telogen effluvium in a 6-year-old girl, one month after infection. The COVID-19 infection presented with mild fever, fatigue, sore throat, and upper respiratory symptoms, treated only with symptomatic therapy. Other causes of hair loss were ruled out. The dermatological evaluation showed diffuse hair loss on the scalp, more noticeable in the frontoparietal region, with no scarring, accompanied by a positive hair pull test. The diagnosis was made by the dermatologist based on the detailed anamnesis, complete laboratory workup with differential blood count, dermatological assessment, and a positive hair pull test. No medication was prescribed, and after 8 months, the condition improved on its own. This case highlights that post-COVID-19 telogen effluvium is rare in the pediatric population, emphasizing its psychological impact and the importance of reassuring the patient that it is a reversible, self-limiting condition.

Keywords: acute telogen effluvium, hair loss, COVID-19, SARS-CoV-2

Introduction

Telogen effluvium (TE) is characterized by the premature termination of the anagen phase of hair follicles, resulting in an increase in telogen phase hairs, which leads to excessive and diffuse shedding of telogen club hairs [1-3]. TE can be considered when hair loss exceeds 100 hairs per day [4]. In a healthy individual, about 85% of scalp hair is in the anagen (growth) phase, 15% is in the telogen (resting) phase, and a small percentage is in the catagen (transitional) phase [2]. Hair grows for 2-6 years before resting for 3-4 months [2]. Stress can disrupt this cycle, causing up to 70% of hair follicles to enter the telogen phase prematurely, leading to excessive shedding [2].

Depending on the clinical course and symptoms, TE can be subdivided into three subgroups: acute TE, chronic TE, and chronic diffuse telogen hair loss [2]. This study primarily focuses on acute telogen effluvium, defined as diffuse, non-scarring hair loss, usually reversible and self-limited. It can occur three months after a stressful event and can last up to six months [1,3,5]. Multiple causes are associated with the onset of acute TE, including acute febrile illness, severe infection, major surgery, severe trauma, childbirth, emotional and hormonal

disturbances, weight loss, crash diets, malnutrition, and some medications (such as beta-blockers, retinoids, anticoagulants, propylthiouracil, carbamazepine and immunizations) [2,5,6]. During the COVID-19 pandemic, an association between post-COVID-19 infections and acute TE was also observed as a potential stressor [4,5,7]. COVID-19 infection is a febrile contagious disease caused by the SARS-CoV-2 virus [4,5,7]. Hair shedding usually starts 2-3 months after the triggering event, which is why people notice hair loss after recovering from the infection [5,7]. This study presents a pediatric clinical case of acute TE following a COVID-19 infection.

Case description

We present a rare case of a 6-year-old girl diagnosed with post-COVID-19 telogen effluvium. In September 2020, she was brought to our hospital for dermatological evaluation due to significant and sudden hair loss that occurred one month after a COVID-19 infection. The infection was manifested with mild fever, fatigue, sore throat and upper respiratory symptoms. The child received only symptomatic treatment, which included antipyretics and vitamins. The anamnesis excluded other possible etiologies of hair loss. The dermatological examination revealed diffuse hair loss on the scalp, more prominent in the frontoparietal area, with a non-scarring pattern, and normal scalp skin (Figure 1). The hair pull test was positive. No other skin changes were seen, nor any involvement of the eyebrows, eyelashes, or nails. To exclude other potential causes of diffuse hair loss, a detailed laboratory workup was performed, including testing for iron deficiency anemia, vitamin deficiencies, and thyroid abnormalities. All laboratory parameters were within normal ranges. Microbiological analyses of nasopharyngeal and throat swabs were negative.

The diagnosis of telogen effluvium was made based on the detailed history, dermatological examination, and a positive hair pull test.

The parents and child received psychological support and were reassured that the condition was self-limiting, with a good chance of complete recovery. No specific treatment was prescribed. The condition was closely monitored over several months, showing gradual improvement on its own. Eight months later, the patient had a complete recovery of hair density (Figure 2).

Fig. 1. Acute telogen effluvium with significant hair loss in the frontoparietal region

Fig. 2. Hair regrowth after an eight-month period

Discussion

It is well established that the SARS-CoV-2 virus can affect multiple organs and systems, causing a wide range of clinical manifestations [1,8]. Telogen effluvium is a common sequela of SARS-CoV-2 infection [9]. In adult patients, COVID-19-associated TE occurs earlier than classic TE and has a good prognosis in most patients [9]. However, telogen effluvium in the pediatric population remains insufficiently studied due to the limited number of reported cases. In Table 1, we present pediatric cases of telogen effluvium identified after retrieving the PubMed database. The data were compiled from a small number of studies, reflecting the rarity of the condition in the pediatric population.

Table 1. Pediatric cases of telogen effluvium identified in the PubMed database

ARTICLE	SUMMARY OF REPORTS
Manca E, *et al.* [10] .	A 6-year-old girl was diagnosed with telogen effluvium 3-months after receiving 2 doses of the COVID-19 vaccine and after an episode of multisystem inflammatory syndrome. It is unclear whether the COVID-19 vaccination played a role in the telogen effluvium or if it was due to an asymptomatic SARS-CoV-2 infection. Complete regression of telogen effluvium was observed after 12 months of follow-up.
Chrabieh R, *et al.* [11]	Out of a total of 142 patients, nine were pediatric patients, of which only 25% (or 2 patients) had telogen effluvium associated with COVID-19 infection.
Özen T, *et al.* [12]	Out of a total of 46 patients, one male pediatric patient presented with TE, with an unknown age under 18 years.
Saki N, *et al.* [13]	A 17-year-old girl diagnosed with intermittent chronic TE two weeks after an upper respiratory infection, suspected to be COVID-19. The timing of the infection (during a major COVID-19 peak), the lack of vaccination against COVID-19, and the recent positive history of documented COVID-19 in close contacts led us to reasonably assume that the girl's infection was COVID-19.
Hayran Y, *et al.* [8]	A 10-year-old boy was diagnosed with TE. Two months prior, he tested positive for SARS-CoV-2 and developed COVID-19-associated multisystem inflammatory syndrome.
Savaş Şen Z, *et a.l* [14]	A 7-year-old girl developed telogen effluvium 73 days after being diagnosed with COVID-19-associated multisystem inflammatory syndrome.

The exact pathophysiological mechanism of telogen effluvium resulting from the COVID-19 virus is still not fully understood [4,8]. Hair loss can be attributed to multiple factors, including the direct viral impact on hair follicles, immune system activation with cytokine release, hormonal imbalances, psychological stress, and nutritional deficiencies [15,16]. The direct impact of the virus on hair follicles remains under investigation, with current theories suggesting a cytopathic effect on the anagen phase, as well as direct viral damage to endothelial cells, which activates viral coagulopathy and microthrombus formation, leading to follicular ischemia and necrosis [15,16]. However, the primary mechanism is believed to involve immune activation, excessive release of pro-inflammatory cytokines (such as IL-1β, IL-6, TNF-α, and IFN-γ), and a reduction in growth factors (including IGF-1, TGF-β1, VEGF, FGF-β), all of which disrupt the hair growth cycle and may lead to follicular miniaturization or prolonged

telogen [4,7,15]. A cytokine storm can trigger the development of telogen effluvium by damaging matrix cells [4]. Studies have shown that IL-6 inhibits cell proliferation and hair shaft elongation [4,5]. Additionally, high levels of IL-4 have been confirmed to induce keratinocyte apoptosis in hair follicles [4,5]. Other molecules with elevated levels in COVID-19 include metalloproteinases 1 and 3, as well as IL-1β, which may inhibit hair follicle growth [5]. Hormonal imbalances, particularly those affecting thyroid function and elevated cortisol levels, are also implicated in the pathogenesis of hair loss [15]. Moreover, the psychological impact of stress, anxiety, and depression causes the release of specific neurotransmitters, neuropeptides, and hormones that promote changes in hair growth, stimulating the transition of hair from the anagen to the telogen phase [4,8,15]. In severe cases, COVID-19 infection can lead to nutritional deficiencies in key nutrients such as iron, zinc, and vitamin D, which are essential for hair health [7,15]. However, further research is still needed to fully understand the exact mechanisms [4,8].

To establish the diagnosis, it is essential to perform a detailed anamnesis that highlights excessive and diffuse hair loss in the post-infection period following SARS-CoV-2 infection[4,15]. The main therapeutic goal of telogen effluvium is to correct the underlying cause and eliminate the stress factor [4,15]. Educating the patient regarding the self-limited course of the condition is an essential component of managing the disease [3,4].

Conclusion

In summary, post-COVID-19 telogen effluvium is a reversible, self-limiting condition that typically resolves without specific treatment. However, dermatologists must be mindful of its significant psychological and emotional impact on patients. Early diagnosis, patient education and effective management of psychophysical stress are crucial in improving both clinical outcomes and psychosocial well-being. Further research into the pathophysiology of this condition is essential for developing more targeted therapeutic strategies and improving patient outcomes.

Conflict of interest statement. None declared.

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