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Case Report

Trichological Disorders in Organ Transplant Recipients - Case Report and Literature

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Abstract

Kidney transplantation is a life-saving procedure for patients with end-stage renal disease. However, long-term immunosuppressive therapy may lead to adverse effects, including hair disorders. We present the case of a 31-year-old female patient who developed significant alopecia following kidney transplantation and initiation of tacrolimus-based immunosuppression. The psychological impact of hair loss led the patient to consider discontinuing treatment. Dermatological evaluation revealed features of androgenetic alopecia and telogen effluvium. A change in immunosuppression from tacrolimus to cyclosporine A resulted in marked improvement in hair regrowth and overall well-being. To support this observation, we conducted a targeted literature review, identifying four case reports linking alopecia to immunosuppressive therapy in solid organ transplant recipients. This case highlights the need for awareness of trichological side effects among transplant clinicians, especially given their potential impact on treatment adherence and patient quality of life. Regular dermatological assessments and individualized management strategies, including the possibility of modifying immunosuppressive regimens, may help reduce these complications.

Keywords: Organtransplantrecipients; immunosuppressants; trichologicaldisorders; kidneytransplantation; alopecia; tacrolimus; cyclosporine A

Introduction

Nowadays kidney transplantation is the treatment of choice for many patients with end-stage renal disease. Some independent resources have shown that as compare to dialysis, transplantation significantly improves quality of life (1) and increases life expectancy (2).

Transplant recipients must adapt to numerous side effects associated with posttransplant immunosuppression. Many of these align with those commonly observed in the context of immunosuppressive therapies, including increased risk of malignancies and infections. The nature and frequency of these side effects depend on the type of immunosuppressive medication, duration and dosage of drugs. While skin cancers related to solid organ transplantation are well-documented in the transplant literature,

there is limited information on trichological issues following transplantation. Drug toxicity can contribute to severe hair disorders in Organ Transplant Recipients (*OTRs*).
Side effects of medications can lead to non-compliance or even to discontinuation of the treatment by patients. Alopecia, often noticed by patients before being diagnosed by doctors, can significantly impact the quality of life (3), especially in the groups of women and teenagers. Cases of extensive hair loss in *OTRs* impact not only psychological comfort of life, but also may contribute to the onset of depression. Doctors treating transplant recipients should be able to identify signs of drug-induced hair toxicity in order to reduce these side effects.

In most studies on trichological problems in *OTRs* the particular type of alopecia was not specified and the researchers refrained from providing details on the type and characteristics of hair loss.
Androgenetic alopecia (*AGA*) or telogen effluvium (*TE*) can be expected in *OTRs*. These types of alopecia in this population is likely due to the type and duration of treatment and the mean age of the group of these patients. It should be noted that in general population one of the most common causes of hair loss is *AGA* which is a genetically determined condition that develops due to an excessive response to androgens (4).

The other type is *TE* which refers to the excessive loss of hair in the resting (telogen) phase due to factors such as metabolic stress, hormonal fluctuations, or medication use (5). Another form of alopecia that can be considered in the discussed group of patients, due to the use of high doses of immunosuppressive drugs, is anagen effluvium (*AE*). Anagen effluvium is a condition in which anagen-phase hairs experience toxic or inflammatory damage, leading to the fracture of the hair shaft (6). The other type of nonscarring hair loss is alopecia aerata (*AA*), which can vary from small patches (<1 cm) to very large, and even to complete hair loss on the scalp (alopecia totalis, *AT*) or the loss of hair on the scalp, face, and body (alopecia universalis, *AU*) (7).

It should be noted that various etiological factors may predispose *OTRs* to different types of alopecia. The type and severity of hair loss can be influenced by the cause of organ failure, the type of transplanted organ, the course of the surgery, concomitant diseases, the type, doses and duration of immunosuppressive therapy. Tacrolimus (*TAC*), for example, has been associated with alopecia, particularly in kidney-pancreas transplant recipients (8), while cyclosporine A (*CsA*) has been linked to hypertrichosis (9-15). The mechanisms underlying these effects are not fully understood. However, several hypotheses have been proposed, including vascular disruption and autoimmune reactions (8).

Aim

The aim of the article is to present the case of a 31-year-old female patient who, after a kidney transplant, sought dermatological consultation due to hair loss for which she was considering discontinuing immunosuppressive medications in an attempt to prevent further hair loss.
This article also synthesize some available information on hair disorders in *OTRs* undergoing immunosuppression, by consolidating data from various published case reports (Table. 1).

Tab. 1 - Case reports in literature

Study	Year	Drug	Transplant organ	Main conclusions
Philips (20)	2005	*CsA*	kidney-pancreas	The development of *AA* in two kidney-pancreas transplant recipients receiving *IS*.
Zuk (16)	2011	daclizumab, sirolimus, and *TAC* at the time of their first transplantation; however, at the onset of alopecia, all were being treated with a combination of *TAC* and *MMF*	islet	Three cases of alopecia in female islet transplant recipients have been described. In all cases, alopecia developed approximately 7 years after the initial transplant.
Okechuku (17)	2015	steroid, *MMF, TAC*	kidney	16-years old female developed anorexia nervosa and alopecia. After switching the immunosuppressive therapy from *TAC* to *CsA*, the patient began to regain weight, and the alopecia resolved.
Gonzalez-Guerra (19)	2019	No available information.	kidney	7 of 469 kidney recipients developed AA. 5 of 7 of them also had another autoimmune disease. 2 of 7 developed AA before transplantation. It remains unclear whether immunosuppressants prevent the development of AA, promote its resolution, or contribute to its onset.

Tab. 2 - Overview of described case

06.10.2018	I Kidney Tx	Initial immunosuppression: - Basiliximab i.v. (as an induction), - Methylprednisolone i.v., followed by Prednisone p.o., - Mycophenolate Mofetil (*MMF*) p.o. - Tacrolimus (*TAC*) p.o. For home treatment: - Methylprednisolone (20 –> 12 [mg/d]) p.o., - *TAC* (blood concentration 11—> 5 [mg/d]) p.o. - *MMF* (1000 —> 500 [mg/d]) p.o.
20.02.2019	Significant increase of hair loss.	Androgenetic alopecia (AGA) and telogen effluvium (TE) were diagnosed (Fig. 1).
25.09.2019	On dermatologist request , transplantologist changed IS.	Conversion from *TAC* to *CsA* (200 —> 125 [mg/d]) was performed.
18.12.2019	Visible hair regrowth.	Continuation of *CsA* therapy.
01.2020	Graft function declined. Creatinine: 3,1–> 4,37. Biopsy: tubular epithelial damage.	No change in trichological status.
29.07.2023	Pre-emptive re-transplantation.	Continuation of *CsA* therapy. Stable hair condition.

Case report

In 2014, the patient was incidentally diagnosed with renal insufficiency. When she was 28 years old, she was admitted to the hospital due to diarrhea/vomiting (suspected food poisoning). The routine blood examination revealed abnormal renal parameters. Most probably kidney disease was diagnosed at it late stage since six months prior, she had started taking allopurinol due to elevated uric acid levels. After the diagnosis of renal failure, she stared peritoneal dialysis for 11 months before transplantation. Based on the clinical and laboratory findings in 2017 suspicion of Gitelman Syndrome was initially considered. However, iatrogenic causes of electrolyte and acid-base disturbances could not be definitively ruled out. The iatrogenic context was supported by the swift normalization of alkalosis observed during hospitalization. Additionally, the possibility of renal medullary cystic disease observed on ultrasound could not be excluded. Peritoneal dialysis was not adequate, fortunately she received a diseased kidney

transplant in 2018. During hospitalization prior to transplantation, the following conditions were identified: severe hypokalemia, significant anemia, hyperuricemia, hyperphosphatemia, hypercalcemia, hypermagnesemia, hyperlipidemia, and metabolic alkalosis.

Initial immunosuppression after kidney transplantation consisted of basiliximab (as an induction), intravenous methylprednisolone, followed by oral prednisone, and mycophenolate mofetil (*MMF*) and Tacrolimus *(TAC)*. For home treatment, the patient had prescribed oral medicaments: methylprednisolone (20 –> 12 [mg/d]), *TAC* (blood concentration 11—> 5 [mg/d]) and *MMF* (oral dose 1000 —> 500 [mg/d]). Four months post-transplantation, the patient began reporting significant increase of hair loss.

The patient considered non-adherence to medical recommendations and even reflected on discontinuing immunosuppressive treatment on her own due to a significantly lowered mood caused by hair loss.

The dermatological examination revealed significant thinning of the hair at the front of the scalp. The pull test was positive, and trichoscopy showed follicular miniaturization and yellow dots. Based on the above findings and clinical history, androgenetic alopecia (*AGA*) and telogen effluvium *(TE*) were diagnosed (Fig. 1). Incorporation of biotin preparation was initiated, followed by topical solution of minoxidil 5% and combination product with estradiol benzoate, prednisolone and salicylic acid topically. At the same time, due to dermatologist's request because of alopecia, transplantologist proposed a change in immunosuppression and conversion from *TAC* to *CsA* (200 —> 125 [mg/d]) was performed. Significant clinical improvement was observed within two months, with partial hair regrowth (Fig. 2). This contributed to a noticeable enhancement in the patient's mood and overall quality of life.

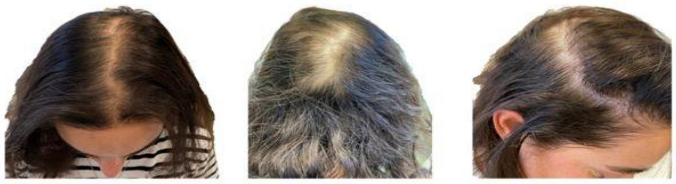


Fig. 1 – Renal transplant patient less than a year after transplantation.
Significant thinning of the hair at the front of the scalp. Trichoscopy showed follicular miniaturization and yellow dots.
Androgenetic alopecia (AGA) and telogen effluvium (TE) were diagnosed.

Fig. 2 - Two months after conversion from Tac to CsA.

Several months later (January 2019), graft function declined, with biopsy showing acute tubular epithelial injury. No signs of acute cellular rejection was observed.

In January 2020 graft function declined (creatynine: 3,1–> 4,37 mg/dl). Biopsy showed tubular epithelial damage. Intravenous fluids during hospitalisation reduced creatinine, suggesting acute kidney injury possibly from dehydration. No other clinical actions were needed at that point.

In July 2023, due to advanced failure of the transplanted kidney, pre-emptive re-transplantation of the kidney from deceased donor took place.

Immunosuppression (prednisone, *CsA*, *MMF*) remained consistent. A patient did not report alopecia problem at that time and later.

In September 2023, acute kidney rejection occurred. A biopsy was performed, revealing severe tubulointerstitial inflammation. The findings met the criteria for the diagnosis of severe acute T-cell-mediated tubulointerstitial rejection (IB according to the current Banff classification). Rejection was succesfully treated with pulses of solumedrol. The patient suffers from recurrent urinary tract infections. Current creatynine level is 2,93 mg/dl.

Discussion

There is a significant amount of information regarding oncological and infectious complications during immunosuppression in transplant patients. Data on trichological disorders in larger populations of *OTRs* are sparse, with only a few case reports available in the literature. Without a doubt, the issue of trichological disorders in this group is often underestimated. The trichological disorders are important for transplant recipients, especially for women and teenagers, as they have a significant impact on their quality of life due to social perceptions. Trichological issues may result in patients refraining from adhering to proper immunosuppressive dosing in an attempt to prevent further hair loss.

This case highlights the importance of monitoring and treating the side effects of immunosuppressive medications, which can lead to severe trichological disorders and significantly affect the quality of life in transplant patients. The change in immunosuppression led to a reduction in hair loss, suggesting that *TAC* was the main risk factor.

Several available studies indicate the involvement of *TAC* in the development of trichological problems. Zuk. et al. described three cases of alopecia in women following islet transplantation (16). Tacrolimus was one of the medications used by patients.

Okechuku et al. also described the case of a 16-year-old female patient who developed adverse effects, including alopecia, one month after kidney transplantation (17). The problem resolved after switching the therapy from *TAC* to *CsA*.

Tricot et al. described that vasoconstriction caused by *TAC* can lead to hair loss (8). It has been shown that hair loss results from impaired microcirculation in hair follicles. One of the side effects of *TAC* is endothelial damage, which may lead to blood flow disturbances.

More studies are required to understand the mechanism of alopecia caused by *TAC*

The underlying cause of alopecia does not seem to be due to an autoimmune response. Tricot et al. demonstrated no association between alopecia and an increased incidence of acute graft rejection (8). Moreover, Shapiro et al. reported that alopecia resolved after reducing the *TAC* dose (18).

Gonzalez-Guerra et al. investigated the relationship between alopecia areata (AA) and solid organ transplantation (19). It

remains unclear whether immunosuppressive drugs prevent the development of AA, promote its resolution, or contribute to its onset.

Philips et al. also reported the development of AA in two kidney-pancreas transplant recipients receiving immunosuppressive therapy, which included CsA (20).

The higher incidence of alopecia among female patients could indicate a disruption in sex hormone balance. Nevertheless Gebhart et all showed rapid resolution of hair loss without hormonal therapy, what challenges this theory (21).

In the diagnosis of alopecia in transplant patients, it is important to consider the entire clinical spectrum of the patient. This includes the underlying disease related to renal failure, endocrinological disorders, other preoperative issues, like previous trichological conditions, immunosuppressive drugs used previously, the course of the surgery, the postoperative period, currently used immunosuppressive drugs and other drugs. A full diagnosis requires a series of biochemical tests (Tab. 3).

Tab. 3 -Suggested laboratory tests in *OTRs* reporting trichological disorders

Basic laboratory tests:
CBC (Complete Blood Count)
AlAT (Alanine Aminotransferase)
AspAT (Aspartate Aminotransferase)
Creatinine
Uric Acid
Hormonal laboratory tests:
TSH (Thyroid Stimulating Hormone)
Free Thyroxine
Free Triiodothyronine
Free Testosterone
Androstenedione
Estrogen
Prolactin
Additional laboratory tests:
Vitamin D3
Ferritin
Iron
Vitamin B12
Dehydroepiandrosterone sulfate
VDRL - Veneral Disease Research Laboratory Test Qualitatively
Antinuclear Antibodies

Dermatological examination is necessary, including a pull test and trichoscopic examination. Trichoscopy should be applied to every patient who is an organ transplant recipient. This examination helps in the early detection of trichological problems, as well as in proposing a classification and establishing a diagnosis of the type of alopecia. Consideration can also be given to performing a trichogram.

In cases of trichological changes related to immunosuppressive medications, a conversion of immunosuppression should be considered in consultation with the transplant specialist. In cases of mixed types of alopecia, multidirectional treatment is required.

(1)Regular monitoring and early intervention can help to prevent or mitigate the progression of trichological problems in *OTRs*. Such practices should be part of routine examinations of transplant patients by dermatologists who specialize in transplant dermatology. Broader studies are needed to evaluate the spectrum of trichological problems in *OTRs*, which would aid in developing more targeted and effective treatment strategies.

Conclusions

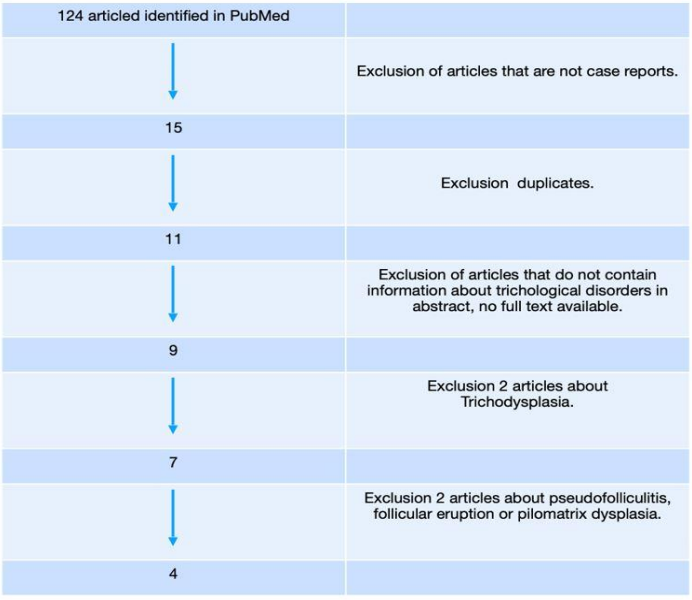
Regular trichological evaluation should be part of routine examinations of transplant patients by dermatologists.In the diagnosis of alopecia in transplant patients, it is important to consider the entire clinical spectrum of the patient. A full diagnosis requires a series of biochemical tests, dermatological examination including a pull test and trichoscopic examination. In cases of trichological changes related to immunosuppressive medications, a conversion of immunosuppression should be considered in consultation with the transplant specialist.

Methods

Table 4 present the search aimed to find case reports about hair disorders among immunosuppressed patients. The PubMed database was searched using different variations of primary keywords like:" immunosuppression"," transplant recipients"," alopecia"," hirsutism" and" hypertrichosis". Inclusion criteria: case reports concerning incidence of trichological disorders and immunosuppressive drugs among solid organ transplant recipients. The search was conducted in April 2025.

The flow diagram of this study is presented in Figure 3. A total of 124 potential studies and publications were identified. The selected publications covered the period from 1980 to 2025. Only case reports were chosen. Some of them where excluded because of duplications or no available information about trichological disorder. Two articles were excluded because of describing Trichodysplasia spinulosa and another three because of describing pseudofolliculitis, follicular eruption or pilomatrix dysplasia.

The final set included 4 articles.



ABBREVIATONS

AA - alopecia aerata
AE - anagen effluvium
AGA - androgenetic alopecia
AT - alopecia totalis
AU - alopecia universalis
CsA - cyclosporine A
IS – immunosuppressants
MMF - mycophenolate mofetil
OTRs - Organ Transplant Recipients
TAC – tacrolimus
TE - telogen effluvium

AUTHORSHIP PAGE

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paper design
the writing of the paper
Reviewing the literature
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