

Case reports

Recurrent <i>Trichophyton tonsurans</i> Tinea in a Surgical Resident and Possible Links to the Workplace Conditions	Antonio Frankol ¹ , Olivia Toma ^{1,2} , Eusebiu Crisan ³
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Abstract

Introduction. Dermatophyte infections (tinea) caused by the anthropophilic fungus *Trichophyton tonsurans* are highly prevalent diseases transmitted primarily person-to-person or via contaminated objects. Objectives: To report a case of recurrent tinea corporis and tinea capitis caused by *Trichophyton tonsurans* in a surgical resident, to evaluate the potential link with the occupational hazards and to highlight the predisposing factors.

Case report. A 30-year-old Italian male surgical resident in France with a history of Celiac Disease and Hypothyroidism presented a *Trichophyton tonsurans* recurrent infection five months after the initial remission. Meantime, an infection with the same pathogen occurred to another surgeon, working in the same team. This relapse prompted an Occupational Medicine investigation to evaluate a potential work-related dermatosis specifically linked to the prolonged use of protective equipment (masks, gloves, surgical attire) and localized humidity.

Conclusions. This case highlights the challenge of managing recurrent dermatophytosis, possibly favoured by subtle systemic factors such as comorbidities with autoimmune mechanism. The rapid relapse suggests that the occupational environment may either contribute to fungal persistence or represent a source of re-contamination. The presence of the same dermatological infection in another member of the team supports the need for consideration of dermatophytosis caused by *T. tonsurans* as a potential occupational disease in surgery personnel and highlights the gaps in existing regulatory tables.

Keywords: *Trichophyton tonsurans*, tinea, surgeon, workplace exposure, occupational disease

Introduction

Dermatophyte infections (tinea) caused by the anthropophilic fungus *Trichophyton tonsurans* are a global concern, transmitted primarily person-to-person or via fomites (contaminated objects) [1, 2]. According to the World Health Organization (WHO), dermatophytoses affect approximately 25% of the global population [3] with 30–70% of adults being asymptomatic carriers. The filamentous fungus *Trichophyton rubrum* is the primary causative agent of this group of diseases [4]. The dermatophyte group consists of 52 keratin-degrading species, classified into nine genera [5]. Within the fungi that cause human dermatophytoses, *Trichophyton rubrum* is the predominant pathogen responsible for infections of the feet, nails, and other body regions [4]. *Trichophyton tonsurans*, an anthropophilic dermatophyte, is the main fungal cause of dermatophytosis such as tinea capitis and tinea corporis [6]. According to large-scale studies, *T. tonsurans* is responsible for over 95% of tinea capitis infections [6, 7]. Apparently, infections due to *T. tonsurans* are always derived from human sources, as there is difficult to infect an experimental animal [8]. Dermatophytoses are found worldwide, with a higher incidence in tropical areas, where elevated temperatures and humidity favour their occurrence [4, 9]. In geographic regions with high prevalence, the incidence of dermatophytosis can reach as high as 40–60% [10, 11]. Several factors—including age, sex, climate, urbanization, socioeconomic status, and cultural habits—can influence the incidence of dermatophytosis [11].

Occupational skin diseases rank among the three most frequently reported occupational diseases in Europe, with most cases resulting from wet work, exposure to workplace chemicals, biological agents and high levels of ultraviolet radiation from the sun [12]. The 2002 Protocol to the Occupational Safety and Health Convention, 1981 (No. 155), defines “occupational disease” as any disease resulting from exposure to risk factors associated with work activities [13]. The key element is the cause-effect relation between occupational exposure and specific injuries [14].

Occupational settings with close person to person contact or shared equipment are considered to be of high-risk. These includes barbershops/salons, where transmission occurs via contaminated grooming tools [2, 15], and healthcare facilities, where outbreaks have been documented, especially in paediatric hospitals, establishing a precedent for nosocomial

transmission [1].

This case report details a recurrent, multi-site dermatophytosis in a 30-year-old adult surgical resident. The infection’s unusual severity, its recurrence despite successful therapy, and the presence of systemic conditions related to the immune defence (Celiac Disease and Hypothyroidism) imposed a thorough investigation.

The temporal and spatial clustering of cases (the co-worker infection) strongly suggests a shared occupational source. By analyzing the confluence of factors—underlying conditions, environmental stresses (occlusion/humidity) from the surgical milieu, and the re-infection pathways—this case report discusses the evaluation of the criteria for occupational disease recognition regarding anthropophilic fungal infections in vulnerable adult hospital workers.

Case Presentation

The patient is a 30-year-old Italian male Surgical Resident, who had been working in a French hospital for three months. His past medical history includes the diagnosis of Celiac Disease and Hypothyroidism. Currently, both diseases were stable, either with diet or with substitution therapy (Levothyroxine). He reported no known contact with domestic or farm animals and no recent aquatic exposure to lakes or rivers, dismissing common external infection sources.

Signs, Symptoms, and Initial Management

The patient’s clinical history involved two distinct consultation phases. He initially presented persistent, intensely pruritic skin lesions for several months, localized to the back, forearms, and hands. Based on these symptoms, a clinical diagnosis of fungal infection was raised oral Itraconazole (100 mg twice daily for 15 days) was prescribed, which regrettably failed to achieve a sustained cure.

Approximately six months after this initial, unsuccessful treatment attempt, the patient returned to the dermatology clinic. At this second consultation, the fungal infection had spread and intensified, presenting with multiple, intensely pruritic and uncomfortable widespread lesions on the back, chest, forearms, hands, beard, and scalp.

Positive Diagnosis and Treatment Course

Upon physical examination during the second visit, the lesions exhibited characteristic dermatophyte morphology:

- **Tinea Corporis:** Well-demarcated, erythematous, and scaly annular plaques were observed. A major lesion with a raised, active border, indicative of peripheral spread, was noted on the upper chest near the clavicle and shoulder (Figure 1). Smaller, distinct annular lesions were scattered across the shoulder and forearm (Figure 2).

- **Tinea Capitis/Barbae:** Examination of the scalp (nape and lower occipital region) revealed areas of erythema and discrete papules, suggesting inflammation and scaling (Figure 3). Lesions were also present in the beard area, confirming tinea barbae involvement.

Mycological cultures, collected from the active borders of the widespread lesions, yielded **positive** results, definitively confirming the etiological agent as *Trichophyton tonsurans*. To rule out drug-related side effects from the impending systemic therapy, a complete biological panel (including Complete Blood Count, ionogram, hepatic, and renal function tests) was obtained and found to be within normal limits.

Given the widespread, multi-site nature and previous treatment failure, the patient was initiated

on the potent oral antifungal agent, Terbinafine (250 mg/day) for a full 4 weeks. A follow-up visit five weeks post-treatment confirmed complete clinical and mycological remission.

Recurrence and Occupational Investigation

Five months after achieving complete remission, the patient consulted again for the reappearance of new plaques, primarily localized on the back and forearms. In the same time a surgical colleague reported similar lesions, specifically on the forearm and in the beard.

This rapid relapse, despite successful prior therapy, and the clustering of cases within the professional environment, triggered an investigation by the Occupational Medicine team. The focus was to assess a potential occupational dermatosis related to the specific working conditions: the prolonged use of occlusive surgical equipment (scrubs, masks, gloves), the high humidity in the operating room, and the potential for transmission via shared, inadequately disinfected materials (fomites).

Figure 1. A major, erythematous and scaly annular lesion, with a raised, active border, is present on the upper chest, near the clavicle and shoulder.



Figure 2. A large erythematous, circular plaque (Tinea Corporis) on the upper back/shoulder blade, with smaller distinct annular lesions nearby.



Figure 3. Areas of erythema and discrete papules observed on the nape and lower scalp, suggesting inflammation and scaling typical of Tinea Capitis in this region.



Discussions

The complexity of this case stems from the recurrent, multi-site infection in an adult healthcare worker, demanding an analysis of individual susceptibility and environmental risk factors to determine occupational causality.

Predisposing Factors: Autoimmunity and Fungal Susceptibility

The patient's autoimmune co-morbidities, Celiac Disease and Hypothyroidism, could be considered as factors influencing the recurrence. These conditions involve low-grade systemic inflammation and potential immune dysregulation [16, 17]. This state may compromise the skin's innate immunity and barrier function, making the patient more susceptible to fungal persistence after initial therapy or highly vulnerable to re-colonization upon re-exposure from a contaminated environment [16, 18].

Literature data reveals that celiac disease is mostly associated with dermatitis herpetiformis (DH), currently considered as the cutaneous manifestation of gluten-dependent enteropathy [19, 20]. Also, celiac disease is associated with various dermatological conditions, including psoriasis, alopecia areata, chronic urticaria, hereditary angioneurotic edema (HANE), cutaneous vasculitis, and atopic dermatitis [19, 20]. In hypothyroidism skin conditions usually implies xerosis cutis (abnormally dry and scaly skin), palmoplantar keratoderma, acquired ichthyosis, pallor, carotenemia, vitiligo, and myxedema (thyroid dermopathy) [21]. Therefore, as both pathologies are autoimmune disorders, a certain dysregulation of the immune defence cannot be excluded at the skin level, favouring the development of fungi infections.

Recurrence, Fomites, and High-Risk Professional Environments

According to the literature, the incidence of recurrent and chronic tinea infections has risen markedly in recent years [22]. Recurrent dermatophytosis is defined as the reappearance of lesions within less than six weeks after the end of therapy [22]. Contributing factors include misuse of inexpensive Over-the-Counter medication, steroid-containing combination creams, occlusive clothing, suboptimal hygiene, poor compliance, drug resistance, pathogen virulence, inappropriate drug selection, dosage or duration, and host-related factors such as immunosuppression or noncompliance. Still causes of recurrence infection are not completely understood [17, 18, 22].

The recurrence five months after a definitive cure with Terbinafine strongly suggests re-infection [23]. *T. tonsurans* spores are known to persist in the environment and could be transmitted by fomites [1, 2].

Workplace environmental assessments

The occupational environment of a surgical resident provides ideal conditions for both fungal proliferation and transmission:

1. Occlusion and Maceration: Prolonged hours spent wearing occlusive surgical attire creates high heat and humidity on the trunk, back, face, and hands. This maceration compromises the stratum corneum, the primary physical barrier, facilitating fungal penetration [15].

2. Transmission through Fomites: The fact that the lesions involved the beard and scalp in both the patient and his colleague highlights a potential transmission vector related to hair grooming or covering practices, a mechanism frequently reported in *T. tonsurans* outbreaks. The co-occurrence of Tinea Barbae suggests potential contamination via shaving instruments, clippers, or towels—sources well-documented in outbreaks traced to barbershops [2, 15], but not applicable in this case. In the hospital setting, this risk may translate by failure to comply with hygiene rules. The clustering of cases in the surgical team provides compelling epidemiological evidence for a shared, persistent source of contamination potentially through occupational environment.

Comparative Occupational Context: Surgical Setting vs. Other High-Risk Professions

The outbreak documented in a surgical unit must be compared to other high-risk professional environments associated with *T. tonsurans* to understand the shared mechanism of transmission.

The risk profile for Barbershops and Hairdressing Salons stems from the primary mechanism of fomite transmission via contaminated grooming tools such as clippers, razors, and towels [2, 15]. This results in direct inoculation and is complicated by the inherent difficulty in sterilizing these instruments, leading to frequent involvement of the hair and beard areas.

In Paediatric Healthcare settings, the primary mechanism of spread is direct healthcare worker-to-patient or healthcare worker-to-healthcare worker transmission via fomites like linens and shared equipment [1]. The shared vulnerability factor here is the close physical contact necessary for patient care, coupled with the high prevalence of *T. tonsurans*.

acting as a reservoir in the paediatric population [1].

Our case, involving a surgical resident, presents a combination of these risks. The infection mechanism involves healthcare worker-to-healthcare worker transmission via shared, inadequately decontaminated attire and fomites (masks, scrubs, shaving tools) [1]. However, a major contributing factor in the surgical setting is the occlusion and humidity resulting from prolonged wear of protective gear, which directly leads to skin barrier breakdown [2]. This makes the individual healthcare worker susceptible, a vulnerability not as prominent in the paediatric setting. Thus, while the paediatric healthcare setting primarily drives transmission through high patient prevalence and close contact, the surgical unit presents a risk due to the confluence of fomite transmission and the physiological vulnerability induced by the profession's required occlusive attire. This dual risk profile strengthens the argument for occupational causality in this surgical resident.

Occupational Disease Assessment in France

The classification of this mycosis as an occupational disease in France poses a regulatory challenge. Dermatophytoses are covered under Table N° 46 (Mycoses cutanées) of the General Regime [24], but the list of "designated work" focuses on animal exposure. Since the source is anthropophilic and environmental within a hospital, the standard criteria of Table 46 are not met. Therefore, recognition requires an extra-tabular procedure via the *Comité Régional de Reconnaissance des Maladies Professionnelles* (CRRMP). This process relies on robust medical evidence from the Occupational Medicine investigation to prove a direct and chronic causal link between the working conditions (occlusion, humidity, fomite exposure) and the infection/recurrence. This case highlights a persistent regulatory gap concerning anthropophilic, hospital-acquired fungal infections in non-traditional risk environments.

According to ILO list of occupational diseases, tinea could be recognized as an occupational disease, only we can prove the link between exposure to this biological agent existing at workplace and developing skin lesion by the worker [14].

One limit in assessing occupational causality in this case is the absence of the environmental determinations at the workplace, lacking the evidence for pathogen source (patients, fomites etc). Another limit is the presence of the disease before starting the job in the current workplace. If there is no proof of re-contamination and there are personal predisposing factors, this case would probably better fit in the

category of work-related diseases (work aggravated disease, as classified in other countries).

For the co-worker, the investigation is somehow different and there are probably more arguments (new onset, absence of comorbidities) in favour of an occupational disease, if proof of contamination is obtained from surfaces, instruments he has been in contact with.

For both, the risk of recurrence is another issue, as many of the working risk factors are more difficult to avoid (such as occlusion and humidity). A very well controlled microclimate and frequent changes of the personal protective equipment would be recommended. The second one is not always possible to control in the operation rooms, where the evolution of the surgery and the magnitude of the team dictate the possibility of taking a small break for changing the equipment.

Conclusions

This clinical case report details a recurrent multi-site dermatophytosis caused by *Trichophyton tonsurans* in a surgical resident with several comorbidities. The infection's unusual severity and persistence, despite adequate systemic therapy, underscore the importance of both individual susceptibility and environmental risk factors.

The rapid recurrence, coupled with the similar case in a colleague, constitutes epidemiological evidence for re-infection from an occupational source. The high heat, humidity, and prolonged occlusion associated with surgical attire create an ideal environment for skin barrier breakdown and fungal proliferation, a mechanism identical to that causing Contact Dermatitis—a recognized occupational dermatosis.

This case may be a turning point for a large study implying this kind of biological exposure in surgeons, for achieving more evidences for occupational diseases.

References

1. Shroba J, Olson-Burgess C, Preuett B, Abdel-Rahman SM. A Large Outbreak of *Trichophyton Tonsurans* Among Healthcare Workers in a Pediatric Hospital. *Am J Infect Control*. 2009;37(1):43–8.
2. Galván-Pérez del Pulgar JI, Martín-Gorgojo A. [Translated article] Outbreak of Tinea Capitis due to *Trichophyton Tonsurans* in Hairdressing Salons: Personal Experience and Description of Cases Found in a Solo Practitioner Clinic from Malaga, Spain. *Actas Dermo-Sifiliográficas*. 2024;115(3):T324–5.
3. World Wide Journal - IJSR. *IJSR - International Journal of Scientific Research*. Available from: [https://www.worldwidejournals.com/international-journal-of-scientific-research-\(IJSR\)/page/p/](https://www.worldwidejournals.com/international-journal-of-scientific-research-(IJSR)/page/p/)
4. Petrucelli MF, de Abreu MH, Cantelli BAM, Segura GG, Nishimura FG, Bitencourt TA, et al. Epidemiology and Diagnostic Perspectives of Dermatophytoses. *J Fungi*. 2020;6(4):310.
5. Mercer DK, Stewart CS. Keratin hydrolysis by dermatophytes. *Med Mycol*. 2019;57(1):13–22.
6. Futatsuya T, Anzawa K, Mochizuki T, Shimizu A. *Trichophyton tonsurans* Infection. *Med Mycol J*. 2023;64(3):49–54.
7. Havlickova B, Czaika VA, Friedrich M. Epidemiological trends in skin mycoses worldwide. *Mycoses*. 2008;51(s4):2–15.
8. Georg LK. *Trichophyton tonsurans* ringworm—A new public health problem. *Public Health Rep*. 1952;67(1):53–6.
9. Taplin D. Dermatophytosis in Vietnam. *Cutis*. 2001;67(5 Suppl):19–20.
10. Verma SB, Panda S, Nenoff P, Singal A, Rudramurthy SM, Uhrlass S, et al. The unprecedented epidemic-like scenario of dermatophytosis in India: I. Epidemiology, risk factors and clinical features. *Indian J Dermatol Venereol Leprol*. 2021;87(2):154–75.
11. Panackal AA, Halpern EF, Watson AJ. Cutaneous fungal infections in the United States: Analysis of the National Ambulatory Medical Care Survey (NAMCS) and National Hospital Ambulatory Medical Care Survey (NHAMCS), 1995–2004. *Int J Dermatol*. 2009;48(7):704–12.
12. Work-related skin diseases - OSHwiki. European Agency for Safety and Health at Work. Available from: <https://oshwiki.osha.europa.eu/en/themes/work-related-skin-diseases>
13. Protocol P155 - Protocol of 2002 to the Occupational Safety and Health Convention, 1981. Available from: https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312338
14. ILO List of Occupational Diseases (revised 2010). Available from: <https://www.ilo.org/publications/ilo-list-occupational-diseases-revised-2010>
15. Addari G, Corbeddu M, Mugheddu C, Chessa M, Vivanet G, Ferreli C, et al. Tinea Capitis Induced by Barber Shaving: Isolation of *Trichophyton tonsurans*. *J Clin Med*. 2025;14(2):622.
16. Ch'ng CL, Jones MK, Kingham JGC. Celiac Disease and Autoimmune Thyroid Disease. *Clin Med Res*. 2007;5(3):184–92.
17. Khan SS, Hay R, Saunte DML. An international survey of recalcitrant and recurrent tinea of the glabrous skin—A potential indicator of antifungal resistance. *J Eur Acad Dermatol Venereol*. 2025;39(6):1185–91.
18. Bhargava P, Nijhawani S, Singdia H, Mehta T. Skin Barrier Function Defect - A Marker of Recalcitrant Tinea Infections. *Indian Dermatol Online J*. 2020;11(4):566–9.
19. Caproni M, Bonciolini V, D'Errico A, Antiga E, Fabbri P. Celiac Disease and Dermatologic Manifestations: Many Skin Clue to Unfold Gluten-Sensitive Enteropathy. *Gastroenterol Res Pract*. 2012;2012:952753.
20. Turjanmaa E, Kaunisto H, Kempainen E, Nilsson N, Hervonen K, Mankki I, et al. Dermal IgA Is Rare in Celiac Disease and Relatives and Lacks Dermatitis Herpetiformis-Type Colocalization with Transglutaminase 3. *J Invest Dermatol*. 2025; S0022-202X(25)03415-3
21. Cohen B, Cadesky A, Jaggi S. Dermatologic manifestations of thyroid disease: a literature review. *Front Endocrinol*. 2023;14:1167890.
22. Appannavar S, Kiran, Pise G, Rohith, P A, Sanagoudar V, et al. Recurrent and chronic dermatophytosis: culprit- not just antifungal resistance. *Int J Res Dermatol*. 2021;7(2):213–7.
23. Majid I, Sheikh G, Kanth F, Hakak R. Relapse after Oral Terbinafine Therapy in Dermatophytosis: A Clinical and Mycological Study. *Indian J Dermatol*. 2016;61(5):529–33.
24. Article Annexe II : Tableau n° 46 - Code de la sécurité sociale - Légifrance. Available from: https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000006750177