

Adult black dot tinea capitis caused by *Trichophyton tonsurans* complicated with herpes zoster

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To the Editor: Tinea capitis (TC) is a common superficial fungal infection of the scalp, and the pathogens vary with geography and socioeconomic status.^[1] We described a case of TC caused by *Trichophyton tonsurans* and subsequently accompanied by herpes zoster.

A 53-year-old Chinese female who presented with a 3-month history of scalp erythema, scaling, and pruritus visited our department. Physical examination revealed erythema, escharosis, and multiple interspersed alopecia patches across the scalp [Fig. 1A]. The dermatoscopy showed scales and corkscrew hairs broken at a distance of 0.5 to 2.0 mm from the scalp with a black spot appearance [Fig. 1B]. Direct potassium hydroxide examination revealed septate hyphae in the scale samples and endothrix spores [Fig. 1C]. Hair stumps were plated in Sabouraud dextrose agar at 25°C for fungal culturing. On the 7th day, the colonies were round with flat edges, white powder on the surface, and brownish red on the back. We adhered cellophane to the surface of the colonies and observed under the microscope; there were abundant branched mycelia, with numerous cord shapes and a small number of pyriform microconidia, with some expanded into spheres. Macroconidia were typically visible with transverse septa and thin, curved walls [Fig. 1D]. After culturing for 2 weeks, the colony center was slightly convex, and the surface was covered with white villous mycelia with radial furrows [Fig. 1E]. The back was flat with a reddish-brown color [Fig. 1F]. Thick-walled spores were common under the microscope; articular spores were occasionally seen, and racquet hyphae were visible [Fig. 1G]. Microculture was further performed in potato dextrose agar medium at 25°C for 7 days; lateral microconidia and mycelia were observed under the microscope, and thick-walled spores were abundant [Fig. 1H]. The fungal strain was identified by DNA sequence analysis using internal transcribed spacer (ITS)-1 and ITS-4 primers, and the results showed a 98.1% consistency with *T. tonsurans* (GenBank accession

number: AB220045.1). Broth microdilution anti-fungal susceptibility testing showed that the strain was sensitive to both terbinafine and itraconazole. After 2 weeks of anti-fungal treatment with oral terbinafine (0.25 g/day) and naftifine hydrochloride and ketoconazole cream (b.i.d.), the erythema and alopecia symptoms were alleviated [Fig. 1I], and subsequent fungal direct microscopy and culturing results were both negative.

However, the patient complained of paroxysmal causalgia in the left head and neck, which appeared 4 days after the therapy. Clustered tension blisters with zonal distribution appeared several days posteriorly in the painful area. The blisters subsided [Fig. 1J, K], but the pain remained. The typical clinical manifestation confirmed a diagnosis of herpes zoster, with the maxillary branch of the left trigeminal nerve affected. After 1 week of anti-viral treatment, the scalp erythema and blisters faded away, and the neuralgia was relieved, with sporadic scabbing and pigmentation. Systemic anti-fungal therapy lasted for 5 weeks; the patient finally recovered and had sporadic pigmentation spots. Direct microscopic examination for fungi was negative.

Neither TC nor zoster herpes relapse was observed at the 9-month follow-up. Dermoscopy re-examination showed that the previous lesions were flush and scaled [Fig. 1L] compared to the normal parts [Fig. 1M]. Hair with scales was observed under a microscope; the proximal hair shaft appeared as cigarette-ash-shaped, and the hair shaft surrounded with white sleeve scales showed increased transparency and uneven texture [Fig. 1N]. The mycology examination results were negative. No scar nor alopecia was observed [Fig. 1O], and no post-herpetic neuralgia sequela occurred.

TC is a worldwide infectious disorder usually found in people under 22 years old.^[2] Over the past 60 years, the

Access this article online

Quick Response Code:



Website:
www.cmj.org

DOI:
10.1097/CM9.0000000000000567

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Chinese Medical Journal 2020;133(1)

Received: 10-08-2019 Edited by: Qiang Shi

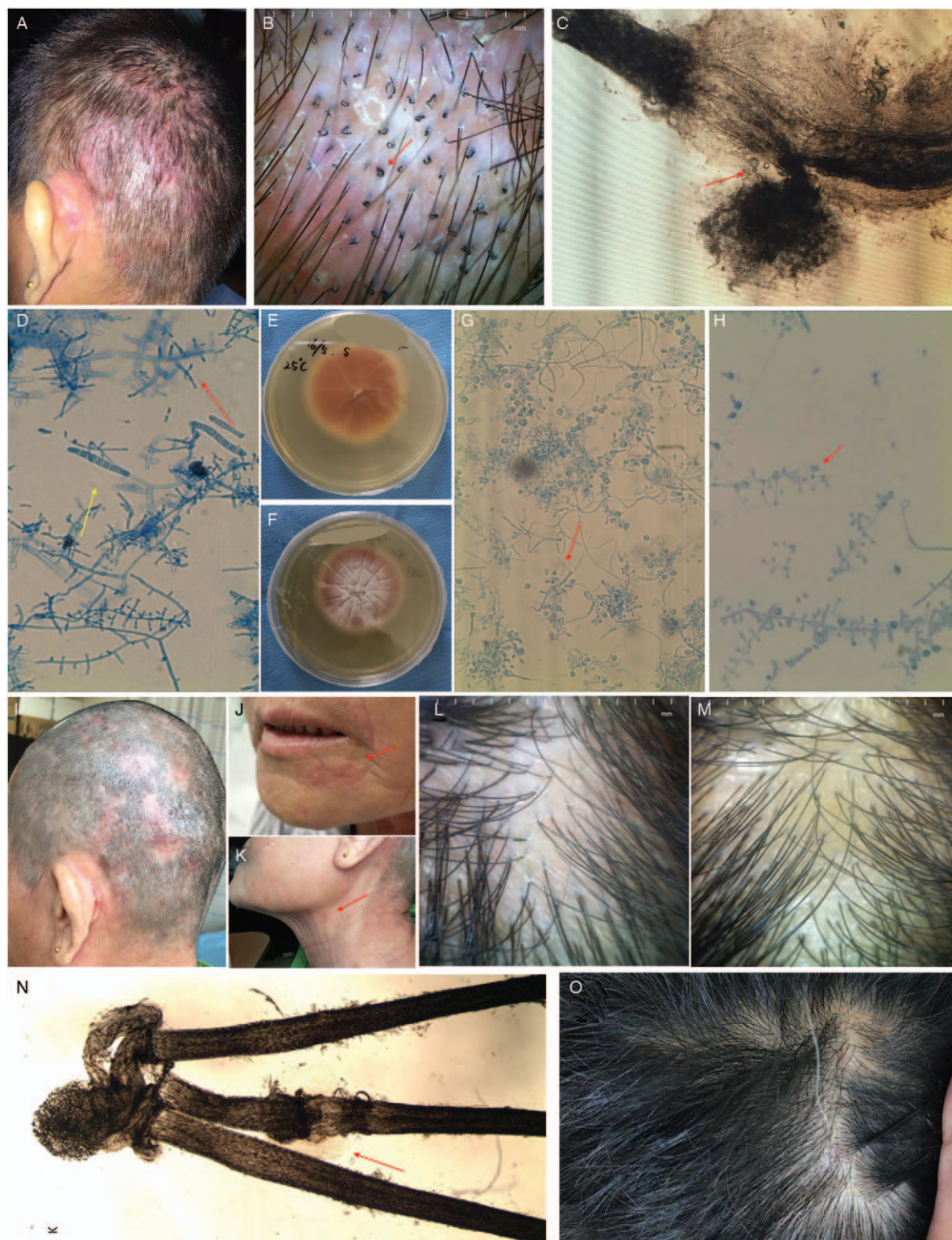


Figure 1: Clinical manifestation and fungal examination of the patient. (A) Typical erythema, escharosis, and multiple interspersed alopecia patches across the scalp. (B) Dermatoscopy examination of the scalp lesions showed scales and corkscrew hairs on a reddish background. The arrow indicates corkscrew hairs. (C) Potassium hydroxide was dripped onto the broken hair; after a while, a large number of fungal spores gushed from the hair shaft (original magnification $\times 100$). The arrow indicates fungus gushing from the hair shaft. (D) Smear of the colony on the 7th day of incubation (lactophenol cotton satin, original magnification $\times 400$). The yellow arrow shows macroconidia, and the red arrow shows microconidia with an inflated terminal. (E) *Trichophyton tonsurans* colony on SDA after 14 days shows a white velvety surface with radial furrows, and the center of the colony was slightly convex. (F) The back of the colony described in (E). (G) Smear of the colony on the 14th day of incubation (lactophenol cotton satin, original magnification $\times 400$). The arrow shows racquet hyphae. (H) Microculture on PDA after 7 days (lactophenol cotton satin, original magnification $\times 400$). The arrow indicates thick-walled spores. (I) After 2 weeks of treatment, there was newly re-grown hair at the lesions. (J) Erythema and papules on the left lower chin. (K) Miliary papule on the left neck. (L) Dermatoscopy re-examination of the previous lesions after 9 months of drug withdrawal. (M) Dermatoscopy image of a normal part of the scalp. (N) Hair after 9 months of drug withdrawal (original magnification $\times 100$). The arrow indicates white sleeve scales. (O) The lesion after 9 months of drug withdrawal. SDA: Sabouraud dextrose agar; PDA: Potato dextrose agar.

fungus distribution pattern has changed substantially in China because of economic development and the urbanization of cities; the year 1985 is considered a turning point. Before 1985, the dominant TC pathogen was *T. schoenleinii*; after that, there was a shift from anthropophilic to zoophilic dominance in most areas of China, and the dominant pathogen became *Microsporum canis*.^[3] In Guangdong Province, *M. canis*, *T. mentagrophytes*, and *T. violaceum* were the most common TC pathogens between 2004 and 2014. *T. tonsurans* is the most usual pathogen in the United States, Canada, and the United Kingdom, whereas in China, it was a rare cause of TC and was last reported in Guangdong in 2007.^[2]

Herpes zoster is a common disease usually accompanied by drastic neuralgia, which results from the reactivation of latent varicella zoster virus in the dorsal root ganglion.^[4] Infection, tumor, surgery, tissue trauma, and other factors may induce shingles.^[5] The association between TC and herpes zoster has not been clarified, but to the best of our knowledge, herpes zoster occurs predominantly in immunocompromised people, such as the children, old people, and patients with chronic diseases, including diabetes^[6] and tumors.^[7] In this case, the patient received a radical mastectomy for right breast cancer 3 years ago and adheres to letrozole daily, which suppresses tumor growth mainly by reducing estrogen levels. Because estrogen regulates the body's immune system by enhancing the macrophage system function,^[8] a drop in estrogen levels could potentially lower the body's immunity and increase the risk of diseases. This patient developed herpes zoster during her TC treatment in exactly the same area, which we do not regard as a coincidence. A review indicated that excessive exogenous stimulation may reactivate the virus lurking in the dorsal root ganglion by stimulating the nerve and thus lead to herpes zoster in the affected dermatome.^[9] Thus, we speculated that the skin damage caused by TC may have stimulated the nerve via some pathways and contributed to herpes zoster in this patient. In sum, we comprehensively and systematically described a case of *T. tonsurans*, which is a rare TC pathogen in Guangdong. Furthermore, this report helps to identify a risk factor of varicella zoster virus reactivation for future study, which has certain academic value.

Declaration of patient consent

The authors certify that they have obtained the appropriate patient consent form. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflicts of interest

None.

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How to cite this article: Zheng YS, Zhou XY, Luo J, Hu YX, Liu KX, Mao ZH, Wu Z. Adult black dot tinea capitis caused by *Trichophyton tonsurans* complicated with herpes zoster. *Chin Med J* 2020;133:91–93. doi: 10.1097/CM9.0000000000000567