An 82-year-old man presented with erythematous and blistering rash on his upper extremities for one month. He was treated with antibacterial agents and incision and drainage of blisters with little improvement in local hospital. The lesions extended with development of scattered pustules over time. Approximately one week prior to presentation, he suffered multiple abrasions on bilateral forearms as he fell off the bike while riding. His medical history was remarkable for diabetes mellitus controlled with diet and exercise. On examination, widespread erythematous, slightly infiltrated plaques and tense blisters, intermingled with pustules, sometimes eroded and crusting were noted over the dorsum of both hands, forearms, and part of the upper arms (Fig. 1 A, B, C, D). Laboratory findings disclosed an elevated white blood cell count of 18.87 $\times 10^9$/L with 81.87% neutrophils and C-reactive protein of 17.0 mg/dL. Chest X-ray and other hematological investigations including HIV serology were normal or negative. Direct microscopy of exudate staining with calcofluor white showed spores and septate hyphae (Fig. 2A). A skin biopsy demonstrated dermal edema and granulomatous infiltrate with multiple rounded to oval, thick-walled spores highlighted by the periodic acid-Schiff and methenamine silver staining (Fig. 2 B, C, D). Fungal culture of both exudate and tissue yielded Alternaria species characterized by colonies with gray-white and cottony surface after 4 days of incubation (Fig. 2 E). Slide culture revealed brown septate hyphae and multiple darkly pigmented ovoidal conidia muriformes in groups and branched chains (Fig. 2 F). The pathogen was identified as Alternaria alternata by internal transcribed spacer region nucleotide sequencing. A diagnosis of cutaneous alternariosis was made. He was treated with itraconazole 200 mg twice daily and the lesions resolved completely after 2 months (Fig. 1 E, F, G, H).

Cutaneous alternariosis is a phaeohyphomycosis caused by Alternaria species and occurs predominantly in immunocompromised hosts. Local trauma facilitates the penetration of the pathogen. Diabetes mellitus considered to represent an immunodeficient state significantly predisposes patients to all types of opportunistic invasive fungal infection. However, very few cases of cutaneous alternariosis associated with diabetes have been reported previously. Herein, we describe a rare case of cutaneous alternariosis in an elderly diabetic patient with antecedent local trauma.

The spectrum of clinical presentations is broad. Lesions can appear as either single or multiple, reddish-brown papulonodular, pustular, ulcerated or crusted plaques. To our knowledge, there are no prior reports of cutaneous alternariosis presenting with bullous lesions. Alternaria species is a potent sensitizer, and a cell-mediated hypersensitivity response seems to be the main mechanism of immune defense against fungal agents. This permits the assumption that
the blister formation accompanied with elevated white blood cells, as well as C-reactive protein can be attributed to a cytokine-mediated highly inflamed process. Alternaria can be isolated from normal human skin or as a laboratory contaminant, therefore, histological confirmation is important to establish the

Fig. 1 Clinical manifestations of the patient. A–D Widespread erythematous, slightly infiltrated plaques and tense blisters, intermingled with pustules, sometimes eroded and crusting over the dorsum of both hands, forearms, and part of the upper arms; E–H After 2 months of treatment, the lesions basically healed, leaving pigmentation and erythema process. Alternaria can be isolated from normal human skin or as a laboratory contaminant, therefore, histological confirmation is important to establish the
clinical significance of a positive culture. In our patient, fungal elements were detected in both exudate and the biopsy specimens. Subsequently *Alternaria* \textit{alternata} was identified by mycological culture and molecular identification.

Management of cutaneous Alternaria infection includes antifungal therapy, surgery, and control of...
underlying conditions. Itraconazole has become the most common therapy and generally has favorable outcomes.

Dermatologists should keep in mind that diagnosis of bullous lesions in diabetic patient must include an appropriate search for infection, especially fungi. Histopathological and mycological examination is necessary for correct diagnosis and identification of the fungal species.

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**Declarations**

**Conflict of interest**  The authors have not disclosed any competing interests.

**Ethical Approval**  This study was approved by the ethical committee of Institute of Dermatology, Chinese Academy of Medical Sciences and Peking Union Medical College.

**Patient Consent Statement**  The authors obtained patient’s informed consent to use the clinical information and photographs in publication.

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