

CASE REPORT

The spontaneous regression of palmoplantar pustulosis following removal of dental amalgams: A report of two cases

Fang Liu,[†] Min Zhang,[†] Yanfeng Lou, Haibo Liu and Hong Sang

Department of Dermatology, Jinling Hospital affiliated to Nanjing University School of Medicine, Nanjing, China

ABSTRACT

Metal allergens are occasionally reported to be associated with palmoplantar pustulosis. We describe two severe, therapy-resistant, chronic cases of palmoplantar pustulosis induced by metal dental fillings. Both patients' clinical findings and symptoms regressed following the removal of their metal teeth. A patch test examination revealed positive reactions to metal allergens in both cases (in Case 1 the positive reactions were to cobalt chloride hexahydrate and nickel sulfate and in Case 2 the positive reaction was to nickel sulphate). Our studies suggest that metal allergens may play an important role in the pathogenesis of palmoplantar pustulosis.

Key words: allergens, cobalt, nickel, palmoplantar pustulosis.

CASE 1

A 41-year-old man was admitted to our hospital in July 2012 after a 1-year history of pustules and hyperkeratosis on both feet (Fig. 1a). He had no personal or family history of psoriasis, autoimmune disease, atopic disease, malignancies, focal infection, drug intake or smoking. Systemic antibiotics, nonsteroidal anti-inflammatory drugs, steroids, tretinoin and topical antiseptics were all ineffective. The patient had received treatment with dental metal restorations for dental caries 1 year before the presentation

(Fig. 1b). A histological examination of a biopsy specimen showed sterile, intraepidermal pustules, identical to palmoplantar pustulosis (PPP) (Fig. 1c). The dental restorations were removed and the patient was prescribed treatment with topical glucocorticoids and tretinoin cream. The pustules and erythema regressed gradually 3 months after the removal (Fig. 1d). The patient showed no recurrence during a 1-year follow up.

CASE 2

A 39-year-old woman presented to our hospital in November 2012 with the complaint of pustules on both palms over the previous 2 years. Multiple treatments were prescribed for her, including systemic antibiotics, steroids and tretinoin, but all were ineffective. She had no allergic disorder or any drug intake in her past history. The laboratory examinations were all within normal limits. Pustule cultures were negative for fungi, bacteria and tuberculosis. The physical examination revealed multiple pustules, vesicles and scaly erythema over her palms (Fig. 2a). She had no tonsillitis and her pharyngeal culture test was negative. The patient had received treatment with metal teeth for dental caries 2 years before her presentation (Fig. 2b). A histological examination of a biopsy specimen taken from the pustules showed diffuse infiltration throughout the dermis and sterile, intraepidermal pustules identical to PPP (Fig. 2c,d). She was treated with topical glucocorticoids and tretinoin cream. When the metal teeth were removed, there was a rapid disappearance of the symptoms within 1 month. (Fig. 2e). She had no relapse of pustules in the subsequent 2-year follow up.

We hypothesised that there was a possible relationship between the PPP and metal allergens. Since copper and nickel are the main components of dental fillings, we

Correspondence: Professor Hong Sang, Department of Dermatology, Jinling Hospital affiliated to Nanjing University School of Medicine, Nanjing 210002, China. Email: sanghong@nju.edu.cn

[†]These two authors contributed equally to this work and share first authorship.

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Abbreviations:

IUD	intrauterine device
LTB ₄	leukotriene B ₄
PPP	palmoplantar pustulosis
SCD	systemic contact dermatitis

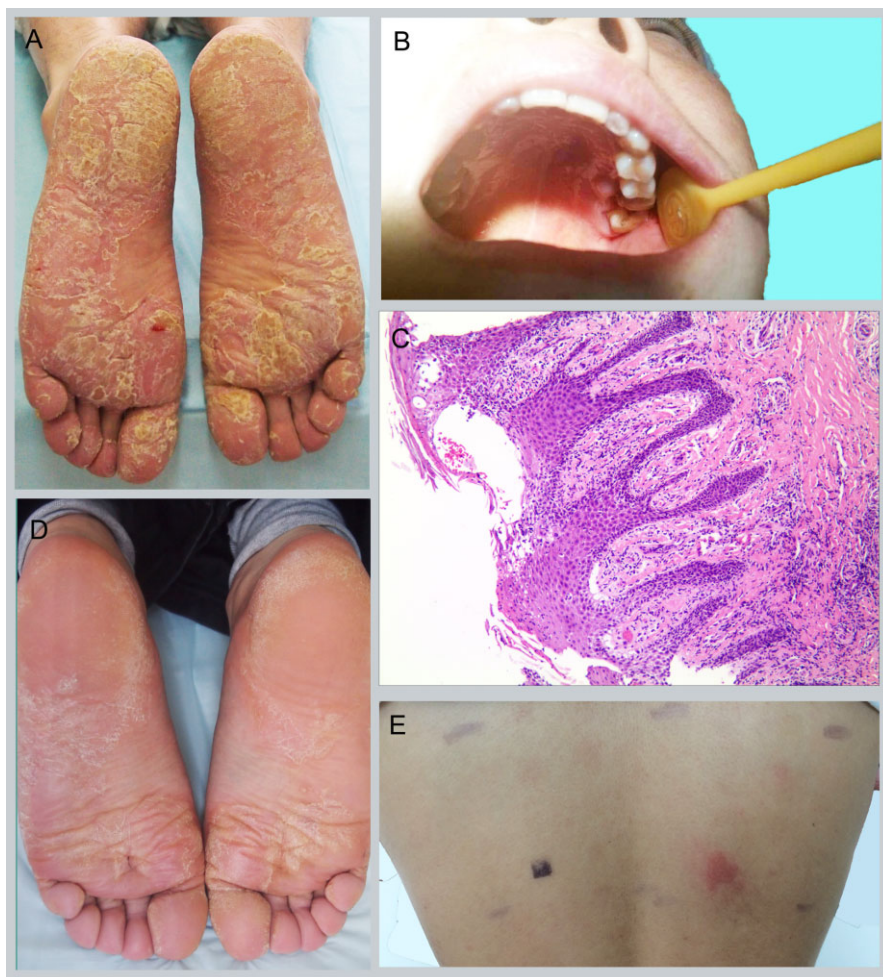


Figure 1 (a) One-year history of pustules and hyperkeratosis on both feet. (b) Metal dental fillings for dental caries. (c) HE 100) Skin biopsy showed sterile, intraepidermal pustules, pathologically identical to PPP. (d) Symptoms regressed following the removal of metal dental fillings 1 month later. (e) Positive reaction to nickel sulfate at 72 h after patch test.

performed patch testing on the patients' backs to look for the possible presence of metal allergy. After 72 h there were pronounced erythematous reactions to cobalt chloride hexahydrate and nickel sulphate (Fig. 1e,f). All other tests were negative.

DISCUSSION

PPP is a chronic, recurrent inflammatory disease characterised by multiple pustules and erythematous plaques on the palms and soles. The aetiology and pathogenesis of PPP have not yet been clarified, and smoking is the most frequently identified environmental trigger. A focal infection, such as tonsillitis, odontogenic infection and sinusitis, is also a well known exacerbating factor for PPP.^{1,2}

Recently, certain metal allergens have been recognised as inducers of PPP eruptions, including nickel, iron, cobalt, zinc and copper.^{3–5} Yanagi and colleagues⁴ reported one PPP case induced by a zinc allergen in a 59-year-old Japanese woman. Histologically identical pustules were induced by a zinc patch test, and a complete remission was subsequently achieved by the removal of the zinc dental restorations. Wen and colleagues⁵ reported a case caused by a copper allergen

in a 42-year-old Chinese woman. This patient had an intrauterine device (IUD) implanted 2 years before the presentation. The pustules and itching regressed within 1 month following the removal of the IUD. Wen and colleagues⁵ suspected the patient was allergic to the metal, and performed a patch test of copper sulphate and nickel sulphate on her back. The same papules developed on the skin under the copper patch.

In light of these recent reports, we suspected that the treatment-resistant PPP in our patients may have been caused by their metal dental fillings. The spontaneous disappearance of pustules and erythematous plaques following the removal of their metal teeth supported this hypothesis. We also performed a series of examinations to rule out other possible causes of PPP in our patients. Neither patient had tonsillitis or other focal infection. Their pharyngeal culture tests were negative. They were both non-smokers. We also performed metal patch tests, including cobalt chloride hexahydrate and nickel sulphate. These two materials are known to be main components of metal dental fillings. Both patients presented with erythematous reactions to patch testing with metals. Clinicians often prescribe antihistamines and steroids to control PPP but fail to find the



Figure 2 (a) Pustules, vesicles, and erythema on both palms. (b) Metal dental fillings for dental caries. (c and d HE $\times 100$) Histological examination showed diffuse infiltration throughout the dermis, sterile, intraepidermal pustules, pathologically identical to PPP. (e) Symptoms regressed following the removal of metal dental fillings 1 month later. (f) Erythematous reactions to cobalt chloride hexahydrate and nickel sulfate at 72 h after patch test.

underlying causes. The patients described, including our own, show the importance of a detailed examination of patients for clues to the possible causes of PPP.

It is not fully understood how metals are involved in the pathogenesis of PPP. Metals are electrophilic and have the ability to ionise and form complexes with proteins.⁶ The complexes can be recognised by dendritic cells, and this results in sensitisation. Okereke and colleagues⁷ showed that copper from IUD is absorbed through the mucus membrane in rats and travels to the skin through the blood or lymphatic vessels with radiolabelled copper. Nakamura and colleagues⁸ found the levels of leukotriene B₄ (LTB₄) in plasma and pustules of the volar surface at 48 h after the metal patch tests were significantly higher than before the metal patch tests in seven PPP patients. Based on this analysis, LTB₄ seems to play an important role in the pathogenesis of PPP. Some scholars consider PPP as one type of systemic contact dermatitis (SCD). The metal allergens in SCD are intercepted by antigen-presenting cells and recognised by T-cells, which migrate to the lymph nodes with blastic transformation, the proliferation of cytotoxic lymphocytes and the production of cytokines. These in turn recall neutrophils and eosinophils to the reaction site, causing capillary dilation and increasing permeability,

resulting in cutaneous inflammation.⁹ More detailed studies with large groups should be performed to explain the triggering role of metals in PPP.

Metals such as nickel, cobalt, chromium, and zinc are ubiquitous in our environment and are widely used in many medical devices including dental fillings, intracoronary stents, knee prostheses and other implants. In addition to PPP, metal allergens may induce other skin eruptions such as allergic contact dermatitis or SCD, characterised by various clinical manifestation such as oral lichen planus, baboon syndrome, urticaria, generalised eczematous reactions, polymorphic or purpuric erythema.⁹⁻¹¹ Metals have been considered important allergens in these allergic diseases. In view of our two cases, it would be worth taking note whether patients with treatment-resistant PPP have had dental metal fillings within a year or two prior to disease onset. If they have, consideration should be given to their removal.

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