Early View Article: Online published version of an accepted article before publication in the final form.

Journal Name: International Journal of Case Reports and Images (IJCRI)

Type of Article: Case Report

Title: Erythema ab igne in patients with dementia: Implications for caregivers

Authors: Zijian Zheng, Sid Danesh

doi: To be assigned

Early view version published: October 13, 2016

How to cite the article: Zheng Z, Danesh S. Erythema ab igne in patients with dementia: implications for caregivers. International Journal of Case Reports and Images (IJCRI). Forthcoming 2016.

Disclaimer: This manuscript has been accepted for publication. This is a pdf file of the Early View Article. The Early View Article is an online published version of an accepted article before publication in the final form. The proof of this manuscript will be sent to the authors for corrections after which this manuscript will undergo content check, copyediting/proofreading and content formatting to conform to journal's requirements. Please note that during the above publication processes errors in content or presentation may be discovered which will be rectified during manuscript processing. These errors may affect the contents of this manuscript and final published version of this manuscript may be extensively different in content and layout than this Early View Article.
**TYPE OF ARTICLE:** Case Report

**TITLE:** Erythema ab igne in patients with dementia: Implications for caregivers

**AUTHORS:**
Zijian Zheng¹, Sid Danesh²

**AFFILIATIONS:**
¹Medical student, Des Moines University College of Osteopathic Medicine, Des Moines, IA50312 USA zijian.zheng@dmu.edu
²MD, Associate professor, Department of Dermatology, University of Southern, California, Los Angeles, CA91776 USA

**CORRESPONDING AUTHOR DETAILS**
Zijian Zheng,
616 N Orange Ave, La Puente, CA91744 USA
Email:zijian.zheng@dmu.edu

**Short Running Title:** Erythema ab igne in a patient with dementia

**Guarantor of Submission:** The corresponding author is the guarantor of submission.
TITLE: Erythema ab igne in patients with dementia: Implications for caregivers

ABSTRACT

Introduction
Erythema ab igne is a benign, asymptomatic skin condition caused by heat exposure. It is an uncommon condition, making it challenging for physicians and healthcare providers to diagnose and follow up for potential progression to malignancy, especially in patients with dementia.

Case report
Here we present a case of erythema ab igne in a 70-year-old gentleman with dementia, in whom careful history taking from family was required to elicit the cause (a warming blanket) and diagnosis.

Conclusion
Erythema ab igne can be recognized and prevented if physicians have a high index of suspicion and are aware of the history and signs. Patients with dementia require particularly close clinical follow up.

Keywords: Erythema ab igne; dementia; squamous cell carcinoma
TITLE: Erythema ab igne in patients with dementia: implications for caregivers

INTRODUCTION
Erythema ab igne is a benign cutaneous disease caused by prolonged heat exposure [1]. Although uncommon, dementia patients are particularly susceptible due to lack of self-care and cognitive impairment. Furthermore, they find the skin condition difficult to monitor, particularly for secondary malignant transformation. Here we report a case of erythema ab igne in an elderly gentleman with dementia to illustrate that a high index of suspicion, close observation, and prompt treatment are required in this vulnerable population.

CASE REPORT
A primary care physician (PCP) referred a 70-year-old Asian man with a history of dementia, chronic heart failure, and back pain to the dermatology clinic due to a 3-month history of unexplained leg rash. Most history was obtained via family members due to the patient’s dementia, who reported multiple scaly rounds to oval shaped blisters on the lower limbs. On examination, the patient was alert and not in distress. He was oriented in person, time, and place and vital signs were stable and within normal range. The patient had general dry and loose skin due to aging with multiple verrucous, hyperkeratotic lesions. There were multiple varicose veins on the posterior lower legs and benign nevi on the face, upper trunk, and abdomen. The lesion of interest was a non-tender violaceous, macular rash resembling livedo reticularis on the right lower lateral thigh and upper lateral leg (Figure 1). The lesion blanched with alternating red pigmentation and normal skin. Healing wounds and hyperkeratotic scars were also present. There were no joint effusions or warmth in the lower extremity joints, which had a full range of both active and passive movement. Motor and sensory examinations were normal. Although the patient had difficulty distinguishing present and past events, he reported no pruritus, pain, or bleeding. His family reported no history of bleeding disorders, anticoagulant use, or similar past events. Apart from 81 mg aspirin every other day, he was not on any other prescribed antiplatelet or anticoagulant therapy.
The patient’s PCP had recently performed a well adult check that revealed normal hematological and biochemical parameters. Further direct questioning of the patient and family revealed that patient had lower back pain and that he was reluctant to take pain medication. He had instead been using an electrical warming blanket to alleviate his back pain. His family often found him forgetting to turn it off and sleeping with it in place. The patient lay on his left side at sleep.

Given the history and findings, erythema ab igne was diagnosed. The patient was given triamcinolone cream and the lesions had resolved by the next visit. Instructions on prevention of similar symptoms were given to patient and the care-giver.

DISCUSSION

Erythema ab igne describes persistent, blanching erythematous areas that gradually develop into reticulated pigmentation and focal epidermal atrophy due to excessive or long-term heat exposure. The heat is not usually hot enough to cause overt burning in most cases. Hemostasis cause by the heat leads to a mottled appearance and subsequent pigmentation. The pigmentation can be erythematous, violaceous, pink, gold or dark brown. Various heat sources have been reported to cause erythema ab igne including heating pads, heating pans, and even laptop computers [2]. In our patient, a heating blanket led to his symptoms and signs. In most cases, after removal of the heating source, pigmentation gradually resolves but permanent pigmentation is possible [3].

A skin biopsy should be obtained to rule out other etiologies rather than to confirm the clinical diagnosis of erythema ab igne, which has non-specific histopathologic findings [4]; indeed, the biopsy taken in this case showed only a sparse perivascular infiltrate and non-specific findings. In early disease, epidermal atrophy, lymphocytic infiltrates, and epithelial atypia may be seen with dermal elastin deposition seen in late disease. Epithelial atypia can progress into squamous cell carcinoma, which is preventable with 5-fluorouracil or imiquimod. The use of steroid cream may help to reduce the pigmentation [5].

Livedo reticularis and other vasculitides should form part of the differential diagnosis, but our patient’s recent normal laboratory results helped us to rule out any systemic
vasculitis. Further, the patient did not have other symptoms such as fever or weight loss.

Close follow up of patients with erythema ab igne is crucial, not only due to a risk of malignancy but also because it is hard for patients to monitor skin changes on the lower back and at other difficult to see locations. Ulceration and worsening of the lesion warrant biopsy to rule out squamous cell and Merkel cell carcinomas, both of which have been described in association with the condition [6]. Dementia patients in particular need close follow-up since they are less likely to self-monitor and may continue to apply heat. Physicians and other healthcare providers managing dementia patients need to pay close attention to the use of heating sources – and make sure that they are properly used - and need to be aware of the cutaneous manifestations of benign and malignant diseases arising from heat exposure to ensure prompt diagnosis and management.

CONCLUSION
Erythema ab igne can be recognized and prevented if physicians have a high index of suspicion and are aware of the history and signs. Patients with dementia require particularly close clinical follow up.

CONFLICT OF INTEREST
No conflict of interest.

AUTHOR’S CONTRIBUTIONS
Zijian Zheng
Group 1 – substantial contribution to the concept and design
Group 2 – drafting the article
Group 3 – final approval of the version to be published

Sid Danesh
Group 1 – substantial contribution to the concept and design
Group 2 – drafting the article
Group 3 – final approval of the version to be published
REFERENCES

1. Riahi RR, Cohen PR, Robinson FW, Gray JM. Erythema ab igne mimicking livedo reticularis. International Journal of Dermatology 2010 Nov;49(11):1314-7.

2. Riahi RR, Cohen PR. Laptop-induced erythema ab igne: Report and review of literature. Dermatology Online Journal 2012 Jun 15;18(6):5.

3. Stulberg DL, Clark N, Tovey D. Common hyperpigmentation disorders in adults: Part I. Diagnostic approach, café au lait macules, diffuse hyperpigmentation, sun exposure, and phototoxic reactions. American Family Physician 2003 Nov 15;68(10):1955-60.

4. Milchak M, Smucker J, Chung CG, Seiverling EV. Erythema ab igne due to heating pad use: a case report and review of clinical presentation, prevention, and complications. Case Reports in Medicine 2016; 2016:1862480.

5. James WD, Berger TG, Elston DM. Dermatoses resulting from physical factors, 11th ed. Andrew's Diseases of the Skin: Clinical Dermatology. Elsevier Health Sciences, 2011.

6. Tan S, Bertucci V. Erythema ab igne: an old condition new again. Canadian Medical Association Journal 2000; 162(1):77–78.

FIGURE LEGEND

Figure 1: Right leg showing erythematous, violaceous maculopapular rashes
Figure 1: Right leg showing erythematous, violaceous maculopapular rashes