

Erythema Ab Igne

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A 39-year-old female with a past medical history of chronic back pain, due to scoliosis and associated leg length discrepancy, presents to the emergency room with a rash on her diffuse lower back. Her pain had worsened over the past week due to a change in weather and was unrelieved by her normal prescription and over the counter pain control regimen. She had applied a heat pack to her lower back while she was sitting in a chair studying and accidentally fell asleep for an hour. When she woke up, she took a shower and noticed a stinging/burning sensation to her lower back, which she attributed to a burn from the heat pack. When she woke up the next morning, her husband noted the following rash on her back, which persisted for 1 week prior to presentation to physician (Figures 1 and 2).

She initially noted a few blisters which had resolved. She denies associated fevers, chills, myalgias, arthralgias, pruritis, insect bites or rash elsewhere on her body and denies previous episodes of the rash. The patient does admit to frequent heating pad usage for back pain.

QUESTIONS:

1. The most likely etiology of this patient's dermatologic presentation is:

- A. Contact dermatitis
- B. Exposure to thermal heat
- C. Livedo Reticularis
- D. Vasospasm after heat pad removal

2. What is the recommended treatment?

- A. Removal of the offending heat source
- B. Treat the underlying cause of pain
- C. Monitor skin changes for hyperkeratotic changes
- D. All of the above

FIGURE 1:

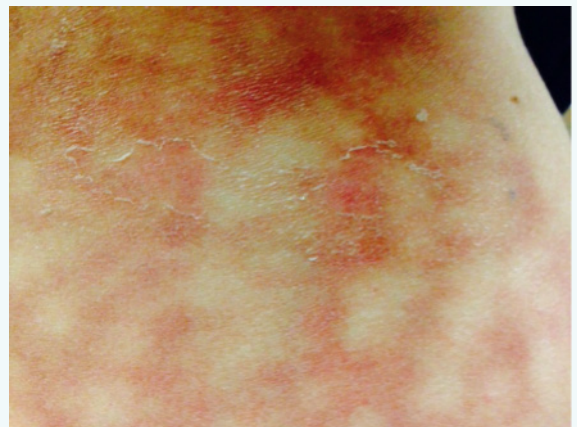
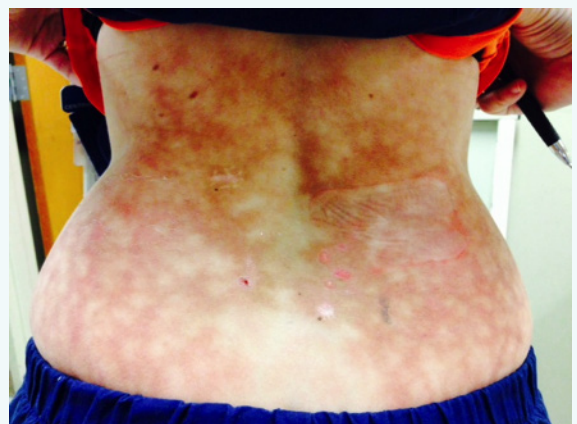


FIGURE 2::



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ANSWERS

1. The most likely etiology of this patient's dermatologic presentation is:

The correct Answer is:

B) Exposure to thermal heat

Thermal Heat. Erythema ab igne (EAI) presents as an erythematous, reticular, net-like dermatosis that develops due to chronic exposure to low level thermal heat.^{1,2,3,4} While contact dermatitis can also occur after contact with a foreign substance, it develops an irritant or allergic reaction.⁵ Manifestation includes erythema, scaling with well-demarcated borders and can affect any area of the body.⁵ Livedo Reticularis (LR) is a disorder of skin vasculature caused by concomitant vasodilation and vasospasm, which presents as a erythematous/purple, mottled, reticulated vascular pattern similar to erythema ab igne, and can be secondary to cold exposure or underlying systemic disease.⁴ Cutis marmorata, physiologic livedo reticularis and Raynaud's disease are due to vasospasm related to exposure to cooler temperatures.⁴ Generally symptoms resolve after cold exposure is removed, however some forms of LR may persist.⁴ Specific vascular causes can be secondary to autoimmune connective tissue diseases, vasculitis and blood disorders that slow blood flow or obstruct the vascular lumen.⁴ In the above case, the history leads to thermal exposure as the suspected cause.

2. Which of the recommended treatment?

The correct Answer is:

D) All of the above

The rash will generally fade over weeks to months without treatment.⁶ In this case, the underlying cause of back pain should be addressed so as to assist the patient in avoiding further thermal heat use. If a patch of EAI fails to fade, or if there are hyperkeratotic plaques present, it may be reasonable to consult a dermatologist.

DISCUSSION

Erythema ab igne (Latin, meaning "redness from fire"), also known as "toasted skin syndrome", presents as an erythematous, macular dermatosis that develops due to chronic exposure to low level thermal heat.^{1,2,3,4} While known as being a historical disease, this skin condition has since seen a reemergence that reflects modernized technology. Formerly, the condition occurred on the shins of elderly people due to lengthy and close proximity to coal fires or stoves.³ With the arrival of central heating, most cases now are due to the use of heating pads, heated car seats, laptop computers, and electric heaters.^{4,7} Acutely, the skin changes associated with EAI manifest as coalescing red bands with erythema present diffusely. Only after repeated exposure will microscopic changes in the skin result in a more defined pigmentary variation.^{3,8}

It is reported that the rash can appear with as little as two weeks of heat exposure, however the time course depends on the temperature of the heat source.⁹ The acute presentation of this mottled rash may be viewed as benign, however, over time there is concern about the development of thermal keratosis and, rarely, squamous cell carcinoma (SCC), cutaneous marginal zone lymphoma, and Merkel cell carcinoma.^{1,3,10}

German dermatologist Abraham Buschke first described erythema ab igne in the early 1900's.¹¹ As with many diseases, there are certain distinguishing cultural and geographical features that are associated with EAI. Most cases have been reported in countries with a cooler climate where people resorted to alternative ways of maintaining their body heat during the cold months.¹² One of these very characteristic cases were the Chinese kang cancers. A Chinese kang is a long, traditional platform made of clay or bricks that was heated by a cooking fire and used for general living and warmth during sleep, thus the greater trochanter was a common area for EAI and SCC to develop.¹³

The early appearance of EAI is that of a transient macular erythema that is distributed in a reticular, or net-like, pattern and is blanchable.⁴ The lesions are characteristically painless, but the patient may complain of a diffuse minor burning sensation or pruritus that resolves as the rash fades.^{4,6} The rash may exhibit multiple colors simultaneously, with areas differing from light pink, to a dusky rose and brown.⁴ Over time, and with chronic exposure to the source of thermal heat, the dermatosis progresses into a dusky hyperpigmentation and no longer blanches.⁴ If the source of heat persists, skin hyperpigmentation may be permanent. Scarring is probable if bullae have formed.⁷ Livedo reticularis, a vasospastic vasculopathy, produces a rash similar to that seen in early EAI and thus should be included in the differential diagnosis.^{3,10} Cutis marmorata and Poikiloderma should also be considered.⁴

Thermal heat damages the epithelium by several mechanisms. First, is direct injury to the cellular structure of the tissue, and second by the release of local mediators such as cytokines.¹⁴ Heat provokes an inflammatory response within the tissue resulting in the release of toxic cytokines as well as free oxygen and nitrogen radicals which potentiate the injury by damaging essential proteins, lipids, and DNA. One of these cytokines is TNF, an acute phase reactant that plays a role in systemic inflammation and cell apoptosis.¹⁵ Cell membranes are specifically prone to these oxidative stresses.¹⁵ Mast cells recruited to burned tissue release histamine, resulting in local vasodilation and edema.¹⁴ Histologically, there may be an abundance of inflammatory cells, connective tissue disintegration, and hemosiderin deposition.¹⁴ The rash pattern parallels the dermal venous plexus, where hemosiderin deposition results in the net-like reticular appearance.^{4,9}

Many patients do not associate their rash with the source of heat exposure. It may be up to the clinician to perceive the markings of EAI and then question the patient about a possible persistent exposure to a heat source. Specific questioning should focus on occupation and hobbies, as certain exposure patterns have been noted (EAI on the forearms of bakers, or the face and arms of glass blowers and foundry workers).^{4,6} In other instances, patients may be using heat as a means of pain relief. EAI is often seen in patients with longstanding back and abdominal pain who find comfort with the application of heat.³ EAI in the lumbosacral region suggests a musculoskeletal dysfunction.⁴ It has also been seen in the setting of

malignancy or visceral disease, specifically pancreatitis, peptic ulcer disease, primary cancers, as well as metastatic neoplasms.^{4,7,16} In these cases, EAI ensued after the chronic use of a heating source to mitigate pain associated with these underlying processes.⁷

Within a longstanding patch of EAI, a keratotic skin lesion called a thermal keratosis (TK) may emerge.¹¹ TKs will appear as hyperkeratotic papules and plaques. There has been reported evolution of these lesions to invasive squamous cell carcinoma from TKs, however there is little information in the literature with reference to the percentage of progression of TK to invasive SCC or of the prognosis of thermal SCC.^{1,7,10,13}

The diagnosis of EAI is a clinical diagnosis with labs and imaging offering little benefit. If there is uncertainty of the diagnosis, however, or if there are hyperkeratotic plaques or papules within the patch, a punch or shave biopsy is indicated.^{1,3,13,17} If multiple lesions exist, the clinician should pick the largest, most representative lesion in the least cosmetically important area for biopsy.¹⁸ When concerned regarding SCC, sample from the most central and thickened area of the lesion.¹⁸ The most important step in treatment is to remove the offending heat source. In most cases, the rash will fade over weeks to months without treatment.⁶ If there are cosmetic concerns due to hyperpigmentation, topical tretinoin may be used to improve the appearance of the rash.^{6,17,19} Laser therapy and cryosurgery are also acceptable options if tretinoin is contraindicated. If a patch of EAI fails to fade, or if there are hyperkeratotic plaques present, it may be reasonable to consult a dermatologist. 5-fluorouracil cream has been used if the lesions exhibit pre-cancerous morphology on punch biopsy.^{3,8}

Osteopathic manipulative therapy (OMT) may have proven helpful in this particular patient. The OSTEOPATHIC trial was a randomized double blind trial that demonstrated that OMT treatment did result in moderate to substantial improvement in low back pain symptoms when used to complement other co-treatments. OMT also decreased the need for prescription medications. Some of the techniques utilized in the study were high-velocity, low-amplitude thrusts, soft tissue stretching, kneading, and pressure, myofascial stretching and release, and positional treatment of myofascial tender points.⁸

In summary, EAI presents as a localized, erythematous, and reticulated rash that develops due to a low level of heat below the point for a thermal burn. Over time, if continued thermal damage occurs, squamous atypia may appear histologically, which can progress to a cutaneous malignancy, namely SCC. First and foremost, the physician should determine the underlying reason for the use of heat. Many patients who present with EAI are attempting to alleviate chronic pain, in rare cases hinting at an underlying malignancy.⁸ EAI itself can be very easily identified and allow prevention of progression to more serious cutaneous disease. The ICD 10 code for EAI is L59.0.

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FIGURE LEGEND:

Figure 1 and 2: EAI