






Recurrent squamous cell carcinoma complicating erythema ab igne

Carcinoma de células escamosas recorrente como complicação do eritema ab igne

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Abstract

Erythema ab igne (EAI) is a reticulated dermatosis caused by chronic heat exposure. Although typically benign, malignant transformation into squamous cell carcinoma (SCC) can occur and exhibit aggressive behavior. We report the case of a 64-year-old male presenting with a large, ulcerated, invasive SCC on his right leg, arising from chronic EAI induced by 20 years of electric heater and hot water bottle use. Despite successful surgical excision with clear margins, the patient continued heat application postoperatively for pain relief. Two years later, he developed a massive local recurrence with bone invasion, leading to a fatal outcome. This case highlights the critical importance of permanent cessation of the thermal source, not only for prevention but as a cornerstone of management to avoid fatal recurrences in heat-induced malignancies.

Keywords: Chronic heat exposure. Erythema ab igne. Malignant transformation. Recurrence. Squamous cell carcinoma.

Resumo

O eritema ab igne (EAI) é uma dermatose reticulada causada pela exposição crónica ao calor. Embora tipicamente benigno, pode ocorrer transformação maligna em carcinoma espinocelular (CEC), apresentando um comportamento agressivo. Relata-se o caso de um homem de 64 anos que apresentava um CEC ulcerado e invasivo de grandes dimensões na perna direita, resultante de EAI crónico induzido por 20 anos de utilização de aquecedor elétrico e saco de água quente. Apesar da excisão cirúrgica bem-sucedida com margens livres, o paciente continuou a aplicar calor no pós-operatório para alívio da dor. Dois anos depois, desenvolveu uma recidiva local maciça com invasão óssea, levando a um desfecho fatal. Este caso realça a importância crítica da cessação permanente da fonte térmica, não só para prevenção, mas como pilar do tratamento para evitar recidivas fatais em malignidades induzidas pelo calor.

Palavras-chave: Exposição crónica ao calor. Eritema ab igne. Transformação maligna. Recidiva. Carcinoma espinocelular.

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Introduction

Erythema ab igne (EAI), also known as toasted skin syndrome, is a reticulated erythematous-to-hyperpigmented dermatosis resulting from chronic exposure to infrared radiation or moderate heat sources¹. While usually asymptomatic and reversible upon removal of the heat source, prolonged exposure can lead to epidermal atrophy, telangiectasias², and, in rare cases, malignant transformation, most commonly to squamous cell carcinoma (SCC)³. Although several reports describe SCC arising in EAI⁴⁻⁷, invasive SCC is uncommon in this setting, and documented instances of local recurrence after treatment are rarely reported in the literature⁸. We present a case of invasive cutaneous SCC developing on chronic EAI of the lower leg, with histologically confirmed recurrence 2 years after initial surgical excision, highlighting the potential for persistent aggressive behavior and the importance of long-term follow-up in affected patients

Case report

A 64-year-old male presented with chronic lower limb pain and a skin tumor that had been evolving for 12 years. He reported 20 years of using an electric heater and hot water bottles on his right leg for pain relief. Medical history was unremarkable. Examination revealed an 18 cm ulcerated, erythematous tumor with irregular contours, fibrin deposits, and an infiltrated base on the lateral right thigh, extending to the knee with flexion. It bled on contact, surrounded by well-demarcated, reticulated, erythematous, hyperpigmented, atrophic macules (Fig. 1). No other skin malignancies or lymphadenopathy were noted. Biopsy showed carcinomatous proliferation with large, polygonal cells, atypical nuclei, and eosinophilic cytoplasm, consistent with SCC arising from EAI (Fig. 2). Surgical excision achieved clear margins. The patient continued to be monitored frequently in our center for 2 years; persistent ulceration at the surgical site raised suspicion of tumor recurrence (Fig. 3). On further questioning, he admitted continuing to use heat for pain relief post-operatively despite our explanations about the risk. Biopsy and imaging confirmed recurrent SCC with cutaneous and subcutaneous thickening of the thigh, extending to the knee and upper leg, with fibular head lysis and femoral condyle involvement. Amputation was planned, but the patient died before the procedure.



Figure 1. Large, irregular, exophytic, and ulcerated cutaneous tumor with a friable, hemorrhagic surface and yellowish crusts, developing on a background of reticulated brownish-violeaceous and hyperpigmented macules and cutaneous atrophy consistent with erythema ab igne.

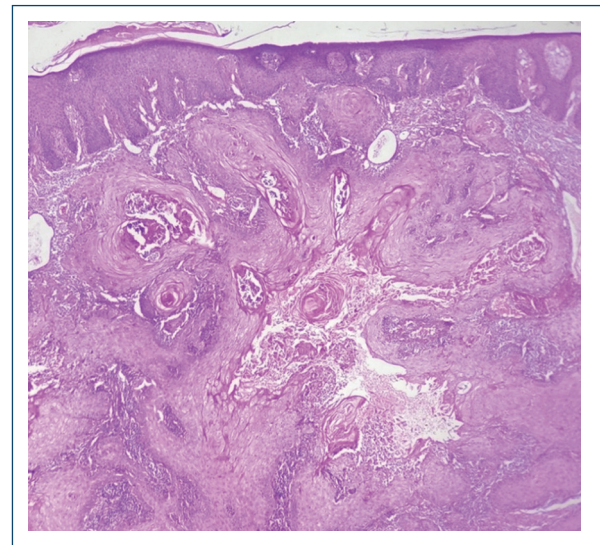


Figure 2. Histopathology: invasive squamous cell carcinoma with nests and trabeculae of large polygonal keratinocytes, marked nuclear atypia, abundant eosinophilic cytoplasm with well-defined borders, dyskeratotic maturation with horny globes, and fibro-inflammatory stroma (H&E, x40).

Discussion

EAI, also known as erythema a calore, ephelis ab igne, ephelis ignealis, or Buschke heat melanosis, hot water bottle rash^{9,10}, is a heat-dependent dermatosis that results from exposure to temperatures up to 45°C¹¹. It is more prevalent in females than males and predominantly in older adults aged in their 70s, especially those with pre-existing chronic pain conditions^{1,6,12}. EAI has been associated with chronic use of heating pads, wood-burning stoves, hot water

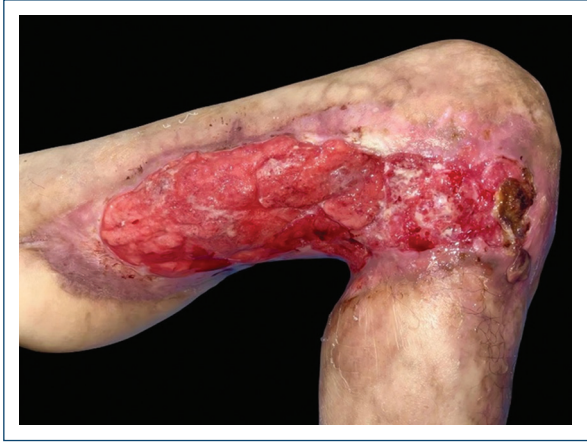


Figure 3. Recurrent squamous cell carcinoma 2 years post-excision. Large irregular ulceration with granulation tissue, fibrinous exudate, and hemorrhagic areas on the lateral right thigh and knee, arising on chronic erythema ab igne.

bottles, or heated furniture, laptop computers, prolonged bathing in hot water, and open fires¹³. The exact mechanisms explaining this relationship remain unknown, although there are a number of potential explanations. One is that continuous exposure to an infrared heat source causes oxidative stress and subsequent DNA damage, which creates a genetic defect that ultimately results in skin cancer¹⁴. In addition, another possible explanation is that this exposition creates an ongoing state of inflammation, establishing a pro-tumorigenic environment for malignant cell growth and survival¹². The diagnosis of EAI is primarily clinical, with an erythematous to pigmented geometric network in the area of chronic heat exposure, papules, bullae, telangiectasias, and hyperkeratosis may also occur¹⁴. It typically manifests on the extensor surface of the lower limbs, as was the case with our patient, or on the trunk of patients⁵. EAI is in the majority asymptomatic, but in some cases, pruritus or localized discomfort has been reported¹⁵. EAI can serve as a valuable clinical marker for identifying diverse underlying diseases, as the location of the rash is directly guided by the site of heat application used for pain relief. Consequently, EAI has been reported in association with a wide range of conditions, such as gastrointestinal and urogenital malignancies, endometriosis, chronic pancreatitis, skeletal system diseases, and mental disorders^{5,10}. Treatment involves the removal of the inciting heat source, which may allow the resolution of early-stage lesions,

topical tretinoin, or hydroquinone for hyperpigmentation³. The persistence of the exposure leads to malignant transformation with an increased risk (Odds ratio 27.84) of developing SCC¹², which can be aggressive and metastasize⁸. Other tumors have also been reported, such as basal cell carcinoma, Merkel cell carcinoma, and even cutaneous marginal zone lymphoma². The latency period between the development of EAI and the appearance of cutaneous malignant conditions can span several years¹³, as was the case with our patient, who developed SCC 12 years after the exposition, and a recurrence 2 years after, underscoring the importance of regular long-term monitoring.

Conclusion

This case illustrates that EAI is not merely a cosmetic issue but a precursor to potentially aggressive SCC. Our findings underscore a critical lesson: continued heat exposure is a key driver of fatal recurrence and deep invasion. Consequently, permanent cessation of the thermal source is the cornerstone of management. Clinicians must maintain a high index of suspicion, perform early biopsies on ulcerative lesions, and ensure rigorous long-term surveillance to prevent such catastrophic outcomes.

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Conflicts of interest

None.

Ethical considerations

Protection of humans and animals. The authors declare that no experiments involving humans or animals were conducted for this research.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from patients, and received approval from the Ethics Committee. The SAGER guidelines were followed according to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing of this manuscript.

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