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Authors
Magro, Cynthia
Lipner, Shari

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Sabra dermatitis: combined features of delayed hypersensitivity and foreign body reaction to implanted glochidia

Cynthia Magro MD, Shari Lipner MD PhD

Affiliations: Weill Cornell Medicine, New York, New York, USA

Corresponding Author: Cynthia Magro, M. D. 1300 York Avenue, F-309, New York, NY 10065, Tel: 212-746-6434, Email: cym2003@med.cornell.edu

Abstract

A striking dermatitis referred to by its colloquial designation of sabra dermatitis is associated with glochidia inoculation from the *Opuntia* cactus commonly known as the prickly pear. We report a 45-year-old woman who had an unexpected encounter with a cactus plant during a trip to Texas. She brushed up against the plant and was aware that she had been inoculated with several spines of the plant. Five days later she developed erythematous papules on the digits accompanied by swelling. The biopsy showed a very striking granulomatous reaction pattern within the dermis. There was a linear pattern of necrobiosis, likely representing a tract of inoculation injury palisaded by histiocytes including multinucleated forms. This necrobiotic tract demonstrated retained glochidia, each measuring roughly 40 to 70 microns in diameter. The nature of the inflammatory response is one that combines features of classic delayed hypersensitivity and an innate foreign body response. The glochidia are capable of eliciting a T cell mediated immune response; it is reasonable to assume that a Th1 cytokine signal is responsible for the unique pattern of inflammation including the secondary influx of neutrophils and relative lack of tissue eosinophilia.

Keywords: sabra dermatitis, cactus dermatitis

Introduction

The implantation of a foreign object into the skin typically evokes an innate immune response defined by a non-immunologically mediated foreign body granulomatous reaction. In some patients an idiosyncratic response in the context of an adaptive immune response may occur whereby the histologic reaction patterns are varied and include eczematous alterations, interface dermatitis, and features of delayed dermal hypersensitivity including an immunogenic pattern of granulomatous inflammation. Classic cutaneous inflammatory reactions that encompass the spectrum of innate immunity and an immunologically triggered response are best exemplified by reactions to injectable filler substances such as hyaluronic acid, implanted silica from antecedent trauma, and red cinnabar tattoo pigment. A striking dermatitis referred to by its colloquial designation of sabra dermatitis is associated with the glochidia inoculation from the *Opuntia* cactus commonly known as the prickly pear [1, 2]. We report a case of sabra dermatitis and include a detailed description of the clinical and histologic findings. The literature is reviewed. Potential immunologic mechanisms that underlie sabra dermatitis are discussed [2-10].

Case Synopsis

A 45-year-old woman had an unexpected encounter with a cactus plant during a trip to Texas. She brushed up against the plant and was aware that she had inoculated her fingers with several spines of the plant. Despite removing all visible spines, she developed erythematous papules on the digits at the sites of inoculation accompanied by swelling and joint pains in digits (**Figure 1**). She had not had similar plant encounters in the past. The patient's past medical and surgical history were unremarkable with the exception of asymptomatic hyperlipidemia

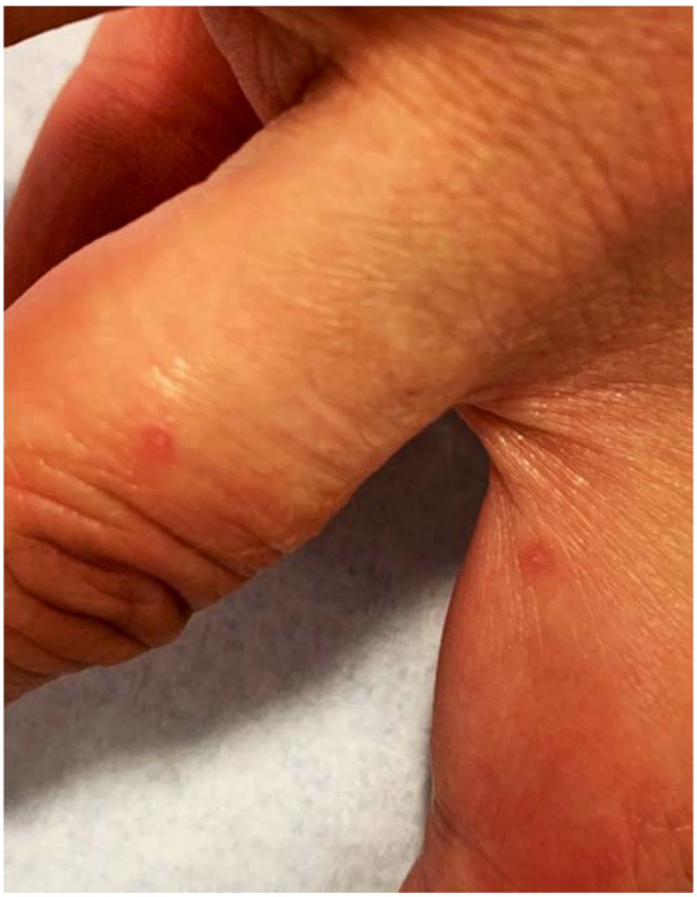

Figure 1. *The patient developed discrete vesicular papular lesions on the medial proximal aspect of the fingers. The clinical differential diagnosis included dyshidrotic eczema and scabies.*

for which she currently takes atorvastatin. A biopsy of one of the erythematous papules was performed.

The biopsy showed a very striking granulomatous reaction pattern within the dermis (**Figure 2A**). There was a linear pattern of necrobiosis, likely representing a tract of inoculation injury palisaded by histiocytes including multinucleated forms. This necrobiotic tract demonstrated retained glochidia, each measuring roughly 40 to 70 microns in diameter (**Figure 2A**, **B)**. They exhibited a distinct heterochromatic biphasic color with one half appearing yellow and the other half exhibiting a steel blue somewhat refractile quality (**Figure 2C)**. Within the fibrinoid zones, there were admixed neutrophils associated with marked cellular breakdown. The released DNA resulted in a distinct basophilic to amphophilic hue to the zone of fibrinoid change. Such foci were palisaded by histiocytes to produce a distinct pattern of necrotizing granulomatous inflammation that was most reminiscent of the palisading granuloma of Churg Strauss (**Figure 2D)**. There were cohesive collections of epithelioid histiocytes associated with the glochidia, some of which were internalized within multinucleated giant cells (**Figure 2E)**. A modest perivascular lymphocytic infiltrate was noted in the superficial vascular plexus. The Gram, Fite, and Acid-fast stains were negative for microbial pathogens, although the glochidia were intensely highlighted by these stains (**Figure 2F)**.

X-rays of hands were normal. She was treated with intralesional corticosteroid injection of 2.5mg/cc to each papule.

Case Discussion

The first reported case of cactus granuloma was by Warthin in 1924 [1]. The author described a woman who developed a granulomatous response to implanted cactus spines while vacationing in New Mexico. The biopsy showed pseudotubercles comprising epithelioid cells, fibroblasts, and plasma cells. The next report was in 1925 was by Robert Barney [2]. He described a 25-year-old man living in Arizona who had been handling cactus plants. He presented with a skin lesion on the right mandible that was described as pruritic; he then developed multiple additional lesions on the trunk, scalp, and extremities over a period of one year. The biopsy showed pseudotubercles characterized by nodular granulomatous foci without caseous necrosis. Interestingly, the patient had concurrent miliary tuberculosis involving the lung and larynx. The inflammatory response was predominantly a foreign body reaction as opposed to being one that was truly immunologically mediated. One study illustrated a true hypersensitivity reaction to *Opuntia ficus-indica*; the patient had a prior history of sensitization to lacquer tree [3]. Over the years a few papers have emerged devoted to this unique form of dermatosis. Despite the established precedent in the medical literature most dermatologists are not familiar with sabra dermatitis [1-9].

In our index reported case the patient had the eruption on the hand for 4 weeks before presenting to the dermatologist. Although the clinical

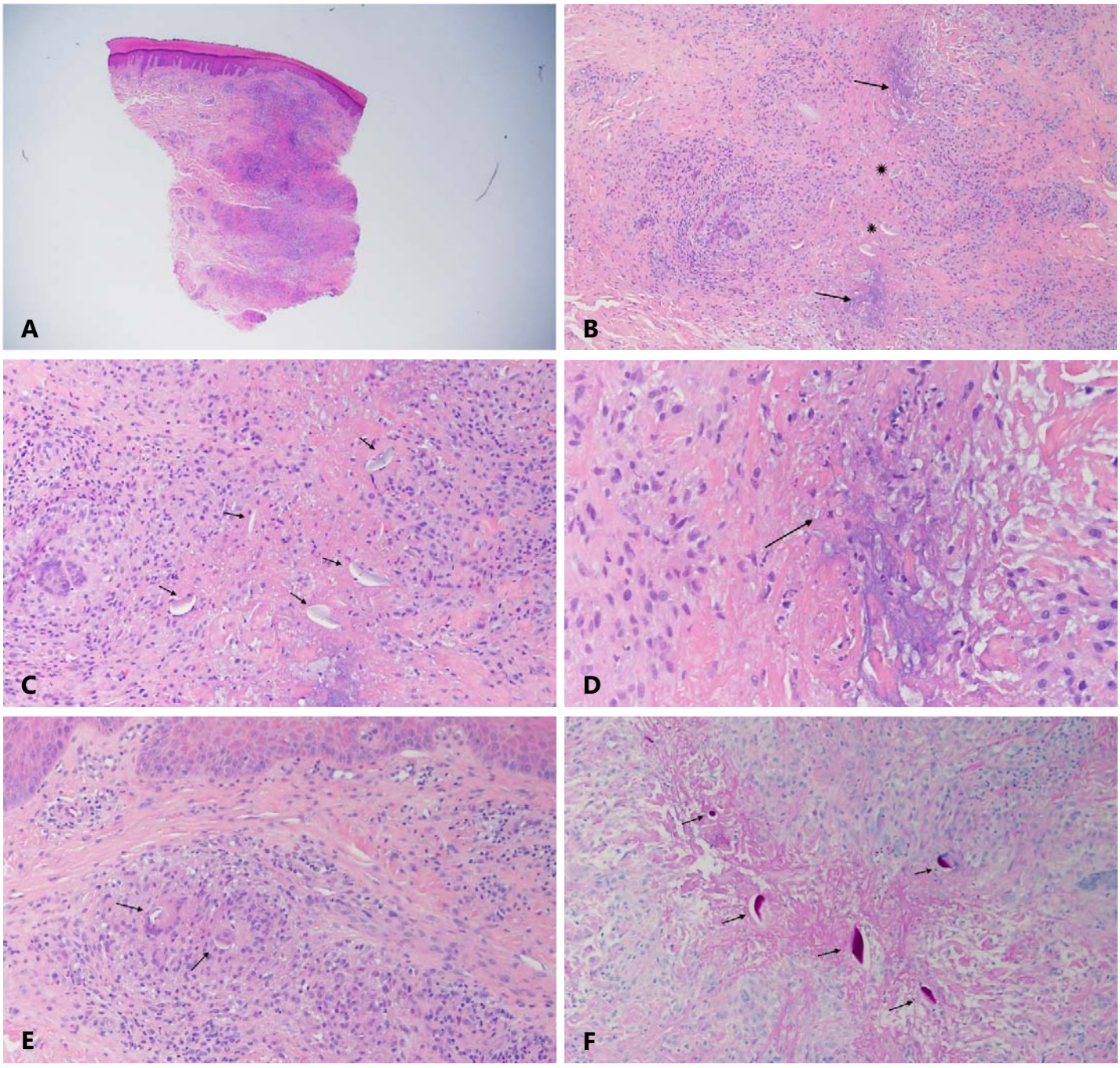

Figure 2. ***A)*** *This low power image shows a striking pandermal granulomatous infiltrate. Coalescing granulomas are present throughout the dermis. A grenz zone separates the granulomatous infiltrates from the overlying epidermis. The epidermis itself does not show any significant pattern of interface dermatitis or eczematous alteration.* ***B)*** *At this higher power the fibrinoid degenerative change within the dermis is discernible as revealed by discrete areas of hypereosinophilia (arrows). Glochids are visible (*).* ***C)*** *The glochids were 40 to 70 microns in diameter. They exhibit a distinct heterochromatic biphasic color with one half appearing yellow and the other half exhibiting a blue somewhat refractile quality.* ***D)*** *A distinct pattern of necrotizing granulomatous inflammation reminiscent of the palisading granuloma of Churg Strauss is observed.* ***E)*** *Cohesive collections of epithelioid histiocytes associated with the glochidia some of which were internalized within multinucleated giant cells are observed defining a morphology most compatible with a type IV immunogenic host response.* ***F)*** *The Gram, Fite and Acid-fast stains were negative for microbial pathogens, although the glochidia were intensely highlighted by these stains. Illustrated is a PAS stain showing an intensely positive reaction within the glochids.*

impression was one of a contact dermatitis, subsequent to the biopsy interpretation of sabra dermatitis it was established that she traveled to Texas, a geographic area in the United States that

defines a natural and preferred habitat for the prickly pear. The biopsy findings were characteristic and similar to the few reports that describe the histologic findings including the original papers from 1924 and 1925, respectively. The hallmarks were the distinctive appearing crescent shaped glochidia manifesting a biphasic heterotopic blue yellow color on hematoxylin and eosin assessment in concert with their intense staining reaction with the Periodic acid–Schiff stain. The structures had elicited a granulomatous response that had features of a true immunogenic granulomatous response along with a foreign body response. The morphologic findings suggesting a true delayed hypersensitivity response included the epithelioid quality of the granulomas and background of lymphocytic infiltration. Another finding we encountered, and which has also been reported in other papers is the presence of necrobiosis, which in our case was most reminiscent of a palisading granuloma of Churg Strauss.

Cactus dermatitis is caused by the dermal inoculation of glochidia derived from the *Opuntia* cactus. The common designation for this unique cactus is prickly pear. Prickly pears are highly distinctive fruit owing to their striking flat branching pads warranting the designation of nopal cactus or paddle cactus. It has been known for many years that the barbed bristles referred to as glochidia can easily detach and implant into the skin evoking a cutaneous reaction of variable severity [4].

Sabra defines the Hebrew name for prickly pear, which also falls under the designation of Indian fig cactus, thus clarifying the origin of the designation of sabra dermatitis. Dr. Crowson and his group have postulated that disruption of the epidermis by the glochidia leads to the induction of the innate immune response which includes proinflammatory mediators contributing to the exuberant inflammatory cell infiltrate [4]. The glochidia are easily separated from the plant and they can be transferred to bystanders through contact with clothing or pets. The dermatitis that occurs is primarily the result of a mechanical or irritant process, although some of the reactions can be truly immunologically mediated as noted here. The adverse sequelae primarily occur when the glochidia permeate the epidermis and enter into the dermis where there is retention of the glochidia. These minute structures may be barbed and once they have penetrated the skin they are difficult to dislodge. The implantation of the glochidia will result in an immediate reaction. If the glochidia are not removed, as would be the case here, that eventuates into an exuberant granulomatous dermatitis.

From a clinical perspective, the classic features are 2 to 5-millimeter asymptomatic papules with a central pinpoint black dot at the site of injury. Ensuing vesiculation and pustulation may occur. A biopsy typically reveals granuloma formation with plant material embedded in the dermis. The barbed bristles give a strongly positive reaction with a PAS stain, a finding that is very well exemplified by this case. When the eruption evolves into this distinctive vesicular and almost scabetic like morphology clinically, it is reasonable to use the designation of sabra dermatitis as has been described [9, 10].

Conclusion

Sabra dermatitis is a unique form of granulomatous dermatitis directly attributable to glochidia implantation. The nature of the inflammatory response is one that combines features of classic delayed hypersensitivity and an innate foreign body response. The glochidia are capable of eliciting a T cell mediated immune response. It is reasonable to assume that a TH1 cytokine signal is responsible for the unique pattern of inflammation including the secondary influx of neutrophils and relative lack of tissue eosinophilia. The dermatologist should have a high index of suspicion that a patient who suddenly develops a vesicular dermatitis in geographic areas indigenous for *Opuntia* cactus could have sabra dermatitis.

Potential conflicts of interest

The authors declare no conflicts of interests

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