Erythema dyschromicum perstans following neurotoxin injection for facial rhytides

Corley C. Pruneda, MD,[a] Mikka Lankford, BS,[b] Jeannie Nguyen, MD,[c] and Michelle B. Tarbox, MD[a]

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INTRODUCTION

This report describes a case of erythema dyschromicum perstans (EDP), also known as ashy dermatosis, following onabotulinum toxin A (BoNT-A) injections to treat forehead rhytides. Morphea-like lesions have been reported to occur after facial neurotoxin injections; however, EDP is not a known complication. This report will address the clinical and histological features that led to a diagnosis of EDP following neurotoxin administration.

Abbreviations used:

BoNT-A: onabotulinum toxin A
EDP: erythema dyschromicum perstans

CASE REPORT

A 41-year-old Vietnamese male, Fitzpatrick type IV, presented to the dermatology clinic for evaluation of discolored areas on his face and trunk. He had undergone BoNT-A injections in the forehead for treatment of rhytides approximately 3 months earlier. He subsequently developed areas of pink-brown discoloration on his forehead as well as gray-brown spots on his upper back. The lesions were asymptomatic but cosmetically bothersome to the patient. Examination revealed multiple 5 to 15 mm ill-defined pink macules and patches with a faintly hyperpigmented rim to the patient's forehead. The most prominent lesion was present in the mid-right forehead in an area that had been injected with neurotoxin 3 months prior (Fig 1, *A-C*).

There were also several ill-defined gray-brown macules and patches to the patient's bilateral upper back that had arisen around the same time. The patient was not on any systemic medications and had no history of a similar rash. He had no known medical conditions but did smoke tobacco. He had not applied any topical medications to his face or undergone any recent cosmetic procedures other than the BoNT-A injections. After reviewing the patient's medical history, a biopsy was performed from the upper back to rule out morphea. Biopsy of the face was not performed to avoid scarring in a cosmetically sensitive area. Haemotoxylin and eosin revealed a mild superficial perivascular lymphocytic infiltrate with moderately impressive melanin incontinence, consistent with EDP (Fig 2).

The patient was treated with hydrocortisone 2.5% cream daily for 2 months and the hyperpigmentation faded over the next several months. He has not undergone further neurotoxin injections and has not developed any new lesions since.

DISCUSSION

EDP is a disorder of pigmentation characterized by hyperpigmented, slate gray or blue-brown macules or patches. It is most commonly seen on the neck, trunk, and proximal extremities but can occur on the face. It classically affects Latin Americans with Fitzpatrick types III and IV but has also been reported in Asians and Caucasians. In the 1970s, Pinkus proposed that EDP was caused by unidentified environmental antigens that were either inhaled, ingested, or came into contact with the patient's skin.[1] There are reports of EDP occurring after

From the Department of Dermatology, Texas Tech University Health Sciences Center, Lubbock, Texas[a]; Texas Tech University Health Sciences Center, School of Medicine, Lubbock, Texas[b]; and Baylor Scott and White, Department of Dermatology, Waco, Texas.[c]

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Correspondence to: Corley C. Pruneda, MD, TTUHSC Dermatology, PGY-3, 3601 4th St, #4th, Lubbock, TX 79430. E-mail: corley.pruneda@gmail.com.

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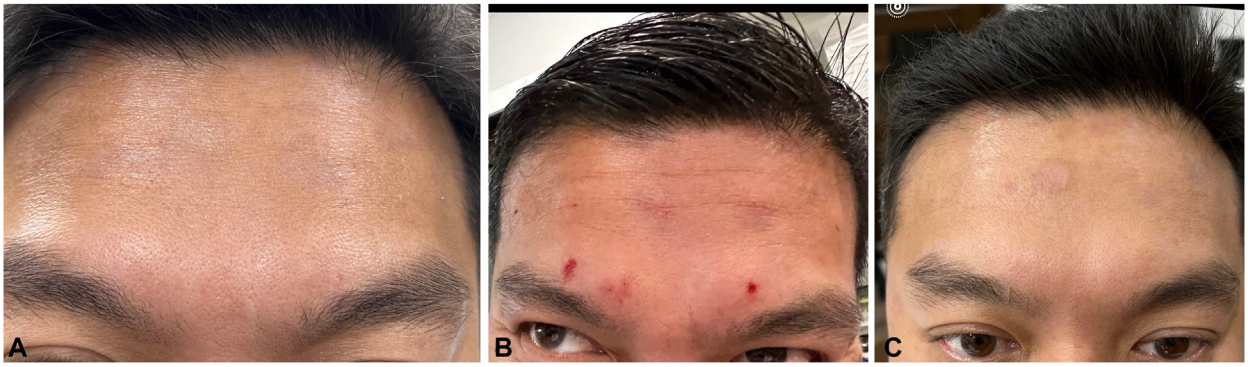

Fig 1. A, Baseline photo of forehead and (**B**) immediately following injection of onabotulinum toxin A. **C,** *Pink* macules and patches on forehead 3 months after injection.

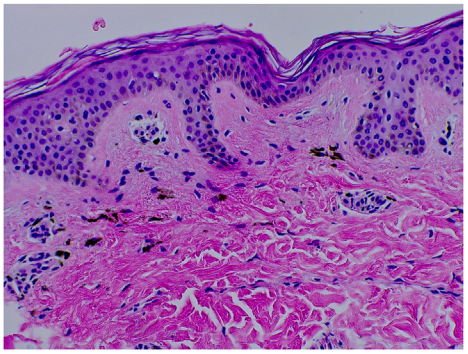

Fig 2. Moderately impressive melanin incontinence with a mild superficial perivascular lymphocytic infiltrate consistent with erythema dyschromicum perstans. (4 mm punch, *upper back*, H&E; Original magnification: 1000×).

ingestion of ammonium nitrate,[2] following viral meningitis,[3] and occurring months to years after initiation of proton pump inhibitors.[4] Recently, morphea-like lesions have been reported following BoNT-A injections for facial rhytides.[5] These are characterized by atrophic plaques or depressions in the forehead appearing within a couple of weeks after neuromodulator injection and self-resolving within 3 months. This phenomenon has been hypothesized to occur secondary to focal, transient neurogenic atrophy of the frontalis muscle, or as a result of a reaction to silicone oil used as a syringe lubricant.[5] While morphea-like lesions have been reported, pigmentary dermatoses such as EDP have not been reported as a side effect of intramuscular BoNT-A to the author's knowledge.

A prospective, interventional, split-faced study from 2020 investigated the effectiveness of neurotoxins in treating facial rhytides based on the anatomic depth of injection.[6] The results showed greater efficacy when BoNT-A was injected deep in the supraperiosteal space rather than in the superficial fatty layer. This is thought to occur because supraperiosteal injection traverses the subfrontal fascia, and therefore, ensures that the neurotoxin is better able to diffuse into the frontalis muscle.[6] While our patient's forehead rhytides were adequately treated by the BoNT-A, the authors postulate that the level at which the neurotoxins were injected may have played a role in the development of EDP. Photos taken immediately following injection were compared with those taken at 3-month follow-up when the patient presented with dyspigmentation. It was noted that the most prominent EDP lesion was present to the mid-right forehead (Fig 1, *C*), where neurotoxin had been superficially injected (Fig 1, *B*). In comparison, a much fainter lesion to the mid-left forehead was present in an area where BoNT-A had been injected supraperiosteally. The authors hypothesize that the superficial injection technique used on the mid-right forehead may have placed neurotoxin in closer proximity to populations of dermal dendritic cells that were then activated and subsequently carried out an immune response that led to EDP.[7] Another factor to consider is that the patient is a tobacco user which is known to exacerbate many inflammatory dermatoses and may have led to the development of EDP by a separate mechanism in a predisposed individual.

We have presented a case of EDP that developed following administration of onabotulinum toxin A for forehead rhytides. EDP is a rare pigmentary disorder with an unclear etiology and it has not been reported following BoNT-A administration. While neurotoxin injections remain a safe and effective means for treating facial rhytides, it is important for physicians to be aware of uncommon side effects to adequately counsel patients and recognize complications when they do occur.

Conflicts of interest

None disclosed.

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