# Disseminated cutaneous *Mycobacterium chelonae* infection as a presenting sign of ectopic adrenocorticotropic hormone syndrome

Meredith A. Park, BS,[a] Lindsey J. Gaghan, BS,[a] Paul B. Googe, MD,[b] Klara R. Klein, MD, PhD,[c] and Julie E. Mervak, MD[b]
*Chapel Hill, North Carolina*

***Key words:*** ACTH tumor; Cushingoid state; Cushing syndrome; disseminated infection; hypercortisolemia; immunosuppression; *Mycobacterium chelonae*; steroids.

## INTRODUCTION

*Mycobacterium chelonae* is a rapidly growing nontuberculosis mycobacterium (NTM). Infection with *M chelonae* typically results from cutaneous injury, injections, or other medical procedures.[1,2] Skin infections by the *M chelonae* complex are heterogeneous and can present as papules, pustules, ulcerating nodules, and deep lesions, such as furuncles and nodules with sinus tracts.[3] Disseminated infections have been described in immunocompromised patients, including those receiving systemic steroids and immunosuppressants such as methotrexate and azathioprine.[2,4-6] To our knowledge, a single case report[2] previously described disseminated *M chelonae* in a patient with endogenous hypercortisolemia (Cushing syndrome).[2] Here, we describe a case, in which endogenous hypercortisolemia secondary to ectopic adrenocorticotropic hormone (ACTH) syndrome resulted in disseminated *M chelonae* infection.

## CASE REPORT

A 43-year-old Caucasian man presented to our clinic with a 3-week history of erythematous nodules on his left upper arm and right leg and bilateral pitting edema (Figs 1 and 2). The nodules were growing and spreading in a sporotrichoid pattern. No improvement was observed with a 1-week trial of doxycycline. He denied fever, chills, nausea, vomiting, and diarrhea.

*Abbreviation used:*

ACTH: adrenocorticotropic hormone
NTM: nontuberculosis mycobacterium

Medical history was notable for new-onset hypertension as well as recent herpes zoster and *Serratia marcescens* skin infection. The patient endorsed a 50-pound weight gain in the preceding 7 months, chronic lower extremity edema, decreased libido, and depression. Physical examination revealed central obesity, dorsocervical fat accumulation, rounded face, violaceous striae on the abdomen and axillae, and muscle weakness.

Evaluation of additional outpatient data, including echocardiogram, complete metabolic panel, urinalysis, thyroid-stimulating hormone, hemoglobin A1c, HIV antibody, and antinuclear antibody, revealed that all of these were unremarkable/within normal limits. A punch biopsy of his right thigh showed granulomatous and suppurative panniculitis (Fig 3, *A*) with numerous acid-fast bacilli (Fig 3, *B*). Tissue cultures from his left arm were positive for *M chelonae*. He was referred to infectious disease for appropriate antibiotic management.

Laboratory evaluation revealed an elevated random cortisol of 46.5 $\mu$g/dL (reference range: 4.5-22.7 $\mu$g/dL). Cortisol was not suppressed with either low- (1 mg) or high-dose (8 mg) dexamethasone suppression test. ACTH was elevated. The

From the School of Medicine,[a] Department of Dermatology,[b] and Division of Endocrinology and Metabolism,[c] University of North Carolina at Chapel Hill.
Funding sources: None.
IRB approval status: Not applicable.
Correspondence to: Julie E. Mervak, MD, Department of Dermatology, University of North Carolina at Chapel Hill, 410 Market Street, Suite 400, Chapel Hill, NC 27516. E-mail: julie_mervak@med.unc.edu.

JAAD Case Reports 2021;18:79-81.
2352-5126

https://doi.org/10.1016/j.jdcr.2021.10.024

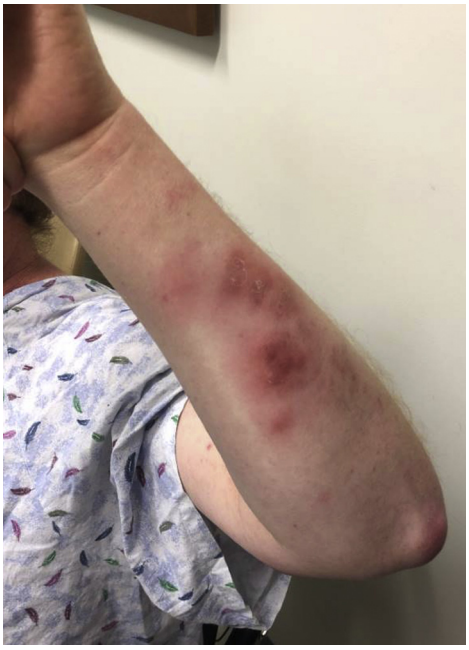

**Fig 1.** Erythematous nodules of the left arm in a sporotrichoid distribution.

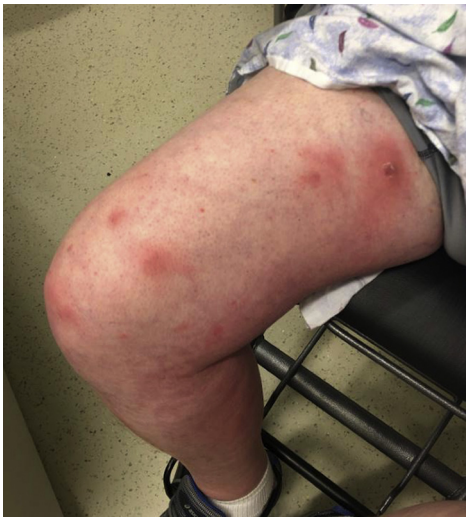

**Fig 2.** Pitting edema and erythematous nodules of the right thigh in a sporotrichoid distribution.

24-hour urine free cortisol was 660 $\mu$g/24 hours (reference range: 3.5-45 $\mu$g/24 hour). No pituitary abnormality was observed on brain magnetic resonance imaging. Inferior petrosal sinus sampling was negative. He underwent a DOTA-TATE positron emission tomography/computed tomography, which revealed a nodule measuring 1.2 cm with mild-to-moderate radiotracer uptake in the lingula, consistent with the source of ectopic ACTH. Given the severity of hypercortisolemia, the patient was admitted to the hospital, and ketoconazole was initiated to inhibit adrenal steroid synthesis while awaiting wedge resection of the lingula. Pathology identified a pulmonary, ACTH-positive, typical carcinoid tumor. Cortisol on postoperative day 1 was 1.4 $\mu$g/dL (normal range: 4.5-22.7 $\mu$g/dL), suggestive of surgical cure.

Supraphysiologic hydrocortisone replacement was started postoperatively, with plans for a slow taper to physiologic levels. Azithromycin and linezolid were continued for treatment of the *M chelonae* infection. One month following surgery, signs and symptoms of hypercortisolemia had dramatically improved, and cutaneous nodules had nearly completely resolved.

## DISCUSSION

Diagnosis of disseminated NTM requires careful consideration given its heterogeneous clinical presentation.[3] Previous reports of patients with disseminated NTM were initially treated with corticosteroids due to the ability of NTM to present similarly to vasculitis or other autoimmune conditions.[4] Given the lack of unifying features of *M chelonae*, biopsy and tissue cultures are necessary for definitive diagnosis.[1,3,5] In this case, biopsy and identification of NTM prompted concern for an immunocompromised host and led to the diagnosis of hypercortisolemia secondary to ectopic ACTH. Given the severity of hypercortisolemia, the patient was at risk of systemic opportunistic infections. Identification and treatment of hypercortisolemia was potentially lifesaving.

Few disseminated bacterial infections secondary to hypercortisolemia are reported in the literature, likely due to the exceptionally high endogenous cortisol levels required for sufficient immunosuppression.[7] Although there is no consensus for what level of hypercortisolemia results in immunosuppression, glucocorticoid excess suppresses both cellular and humoral immunity, increasing the risk of opportunistic infections.[8] Risk is magnified by skin atrophy and fragility. Data suggest that higher cortisol levels increase the risk of infection.[9] Given the degree of immunosuppression associated with disseminated NTM infection in patients with Cushing syndrome and risk of other life-threatening opportunistic infections, patients with disseminated NTM, without a known cause for immunosuppression, should have an expedited work-up for potential underlying etiologies to prevent further complications.[2]

### Conflicts of interest

None disclosed.

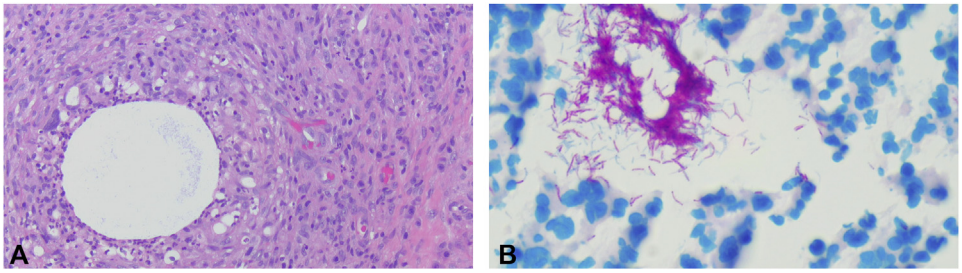


**Fig 3. A**, Tiny cavities in the subcutaneous fat were surrounded by neutrophils and macrophages. **B**, Numerous, beaded acid-fast bacilli were present in the subcutaneous inflammation. Cultures identified *Mycobacterium chelonae*. (**A**, Hematoxylin-eosin stain and **B**, acid-fast stain; original magnifications: **A**, ×20; **B**, ×100.)

## REFERENCES

1. Lamb SR, Stables GI, Merchant W. Disseminated cutaneous infection with *Mycobacterium chelonae* in a patient with steroid-dependent rheumatoid arthritis. *Clin Exp Dermatol*. 2004;29(3):254-257. https://doi.org/10.1111/j.0307-6938.2004.01478.x
2. Haas SR, Hodge MB, Duncan RA. Cushing's syndrome presenting as disseminated cutaneous *Mycobacterium chelonae* infection. *Clin Infect Dis*. 2001;33(6):e51-e53. https://doi.org/10.1086/322629
3. Sardiña LA, Kaw U, Jour G, et al. Diagnosis of *Mycobacterium abscessus/chelonae* complex cutaneous infection: correlation of tissue culture and skin biopsy. *J Cutan Pathol*. 2020;47(4):321-327. https://doi.org/10.1111/cup.13623
4. Touma Z, Haddad A, Gladman DD, Uleryk EM, Urowitz MB. Skin nontuberculous mycobacterial infection in systemic lupus erythematosus: an unusual skin infection mimicking lupus vasculitis. *Semin Arthritis Rheum*. 2013;42(5):498-506. https://doi.org/10.1016/j.semarthrit.2012.08.002
5. Saikaly SK, Weinstein D. Disseminated cutaneous *Mycobacterium chelonae* infection in a patient with dermatomyositis. *Skinmed*. 2018;16(5):343-345.
6. Wallace RJ, Brown BA, Onyi GO. Skin, soft tissue, and bone infections due to *Mycobacterium chelonae chelonae*: Importance of prior corticosteroid therapy, frequency of disseminated infections, and resistance to oral antimicrobials other than clarithromycin. *J Infect Dis*. 1992;166(2):405-412. https://doi.org/10.1093/infdis/166.2.405
7. Lionakis MS, Kontoyiannis DP. Glucocorticoids and invasive fungal infections. *Lancet*. 2003;362(9398):1828-1838. https://doi.org/10.1016/S0140-6736(03)14904-5
8. Fareau GG, Vassilopoulou-Sellin R. Hypercortisolemia and infection. *Infect Dis Clin North Am*. 2007;21(3):639-657. https://doi.org/10.1016/j.idc.2007.06.001
9. Sarlis NJ, Chanock SJ, Nieman LK. Cortisolemic indices predict severe infections in Cushing syndrome due to ectopic production of adrenocorticotropin. *J Clin Endocrinol Metab*. 2000;85(1):42-47. https://doi.org/10.1210/jcem.85.1.6294