

# Methicillin-Resistant *Staphylococcus aureus* Superinfection Delaying the Diagnosis of an Atypical Mycobacteria Infection: Report of a Case

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The incidence of tattoos infected by atypical mycobacteria is on the rise over the past decade. We report a patient who developed an atypical mycobacteria infection from suspected dilution of tattoo pigment by tap water. This patient's initial course was complicated by a secondary infection with methicillin-resistant *Staphylococcus aureus*, thus making the underlying condition a diagnostic dilemma. To facilitate a timely diagnosis, a high index of suspicion for atypical mycobacteria must be maintained when encountering inflammatory papules, plaques, nodules, and pustules in the distribution of a tattoo.

## CASE REPORT

A 56-year-old woman was referred to our clinic for the evaluation of persistent, erythematous plaques at the site of permanent tattoos on her eyebrows. The eruption began 6 months following tattooing with a mixture of 2 taupe tattoo inks (Kolorsource, Microsource, Kailua, Hawaii; KP Beauty Products, Pomona, California) by a tattoo artist working at a medical office. Initial treatment by a separate dermatologist with a 4-week course of

clocortolone pivalate cream 0.1% applied twice a day for a suspected allergic or granulomatous reaction was unsuccessful. A trial of cephalexin 250 mg taken orally 4 times a day for 10 days failed to show improvement. The patient was then seen by another dermatologist and subsequently treated with oral methylprednisolone (tapering from 24 mg to 0 mg over 7 days), oral diphenhydramine 25 mg once a night for 7 nights, cetirizine 10 mg once a day for 7 days, 2 mg of intralesional triamcinolone acetonide, and a single intramuscular injection of 40 mg of triamcinolone acetonide. After 2 months of unsuccessful treatment, the patient was referred to an infectious disease specialist. An elevated erythrocyte sedimentation rate of 56 and an elevated white blood cell count of 14.4 with 75.7% neutrophils were detected, and results of a bacterial wound culture for

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The authors report no conflict of interest in relation to this article.

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methicillin-resistant *Staphylococcus aureus* (MRSA) were positive. The patient was instructed to apply gentamicin ointment 0.1% and bacitracin with polymyxin B ointment to her eyebrows. The results of repeat bacterial wound cultures 4 weeks later were negative. Despite the negative culture results, the tender, crusted, erythematous plaques continued.

Upon presentation to our clinic, the patient demonstrated crusted, mildly indurated, erythematous plaques to the eyebrows (Figure 1). A 4-mm punch biopsy was performed and sent for tissue cultures (bacterial, fungal, viral, and atypical mycobacteria) and routine histopathologic analysis. Histopathology revealed numerous well-formed granulomas composed of epithelioid histiocytes in the superficial and deep reticular dermis. The granulomas showed focal central necrosis with small mature lymphocytes present at the periphery (Figure 2). Fite stain showed rare positive staining rods (Figure 3), but the results of Ziehl-Neelsen stain and Grocott-Gomori methenamine-silver stain were negative. All tissue culture results remained negative. We started the patient on clarithromycin 500 mg taken orally twice a day for 4 months, and she has shown complete resolution of reinfection, though with resultant hypopigmentation (Figure 4).

## COMMENT

Granulomatous dermatitis occurring within a tattoo may be due to a granulomatous reaction to the dye itself,<sup>2</sup> or sarcoidosis,<sup>3</sup> or may be related to infection.<sup>4-19</sup> Red mercury-based (or mercuric sulfide or cinnabar) dye is a common culprit<sup>1</sup> in granulomatous dermatitis due to tattoo ink. Granulomatous reactions due to purple ink, containing manganese, also have been reported.<sup>2</sup> Laser tattoo removal using Q-switched lasers in these instances are contraindicated due to the theoretical risk of evoking a systemic allergic reaction due to the release of tattoo pigment from pigment-containing macrophages and subsequent immune activation to the foreign pigment.



Treatment options include topical steroids and ablative lasers, such as Erbium:YAG and carbon dioxide. Due to the absorption characteristics of the ablative lasers (ie, water), systemic allergic reactions are not seen. The ablative lasers have been shown to facilitate the transepidermal elimination of tattoo pigment through vaporization.<sup>1</sup>

Infectious complications of tattoo placement include *Staphylococcus aureus* (methicillin-sensitive and methicillin-resistant),<sup>4-7</sup> tuberculosis,<sup>8-9</sup> leprosy,<sup>10</sup> verruca,<sup>11-13</sup> zygomycosis,<sup>14</sup> hepatitis B, and human immunodeficiency virus.<sup>15</sup> Multiple outbreaks of community-acquired MRSA have been reported among unlicensed tattooists, occurring within 3 weeks following tattooing.<sup>4,6</sup> Primary inoculation tuberculosis presenting within tattoo has been reported following tattooing.<sup>16</sup> The number of atypical mycobacteria infections presenting in tattoos has been on the rise and often presents as outbreaks among tattoo parlors.<sup>17-19</sup>

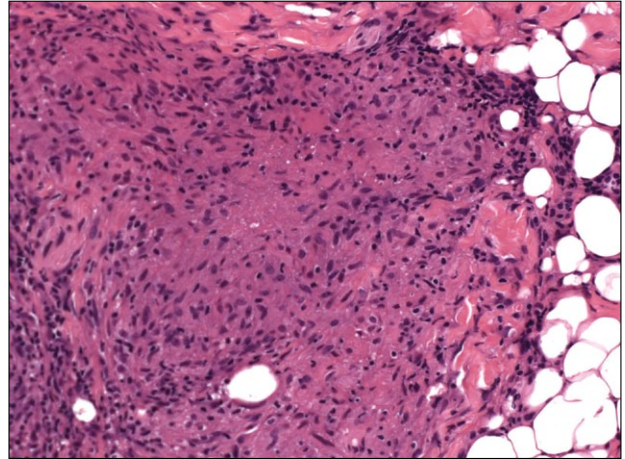
To create gray pigment, tattoo artists dilute black ink with sterile water. Some artists forgo sterile technique and instead dilute with tap water, which is known to be contaminated with atypical mycobacteria.<sup>19</sup>

The first reportable case of a tattoo complicated by atypical mycobacteria was described by Wolf and Wolf<sup>16</sup> in 2003. The patient presented with nodules within and surrounding the tattoo 3 months after tattoo placement. The patient declined systemic antibiotic therapy and showed no clinical improvement.<sup>16</sup> Preda et al<sup>15</sup> described extensive tribal tattoos complicated by a *Mycobacterium chelonae* infection. The patient was treated with a 4-month course of moxifloxacin 400 mg once a day and clarithromycin 500 to 1000 mg twice a day. Contamination was linked to an industrial metal bolt placed in the bottle used for mixing tattoo ink.<sup>15</sup>

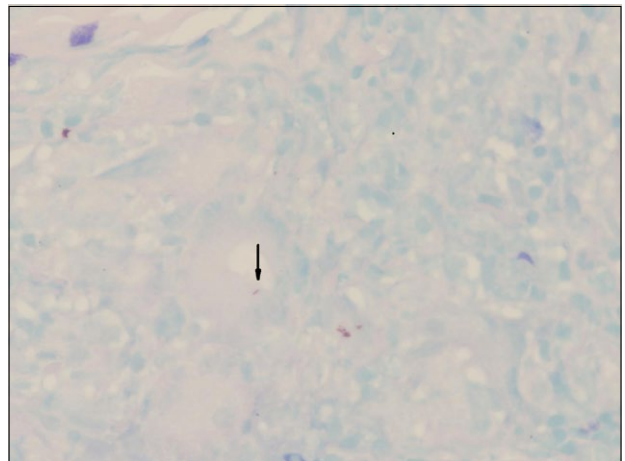
Multiple outbreaks of atypical mycobacteria following tattoo placement have been reported.<sup>17-19</sup> Kluger et al<sup>17</sup> described 8 cases of atypical mycobacteria-infected tattoos associated with a single tattoo artist. The contamination resulted from black tattoo ink diluted with

**Figure 1.** Crusted, mildly indurated, erythematous plaques to the eyebrows.

**Figure 2.** Histopathology of a punch biopsy specimen revealed granulomas showing focal central necrosis with small mature lymphocytes present at the periphery (H&E, original magnification  $\times 20$ ).



**Figure 3.** A punch biopsy specimen shows rare positive staining rods (Fite stain).



tap water to form a gray hue. The clinical presentation in this series involved pustules and inflammatory papules restricted to the distribution of the gray tattoo pigment. The average time elapsed between tattoo placement and the initial presentation of clinical lesions was 13.5 days, with a range of 7 to 21 days. Pathology was characterized by pseudoepitheliomatous hyperplasia and intracorneal pustules. All of the patients displayed negative results for wound cultures for acid-fast bacilli; however, the implicated bottle of tattoo ink showed positive staining for acid-fast bacilli. The majority of patients were treated with minocycline 200 mg once a day or clarithromycin stearate 500 mg once a day for 1 month. Two patients initially treated with minocycline 200 mg once a day were switched to clarithromycin stearate 500 mg once a day after 1 month due to minocycline-induced vertigo. All patients who received systemic antibiotics showed improvement.<sup>17</sup>

De Quatrebarbes et al<sup>18</sup> described a similar outbreak of *M chelonae* from infected gray tattoo ink in 20 men treated at a single tattoo parlor. Lesions were

confined to the gray tattooed areas. Patients were managed with systemic tobramycin and clarithromycin.<sup>18</sup> Another outbreak of *M chelonae* occurred in 6 patients 1 to 1.5 weeks after placement of tattoos by a single artist at a tattoo parlor. Similar to other reports, papules, pustules, and/or plaques were confined to the distribution of gray tattoo ink. Four of 6 patients had granulomas present on histological exam. The results of acid-fast bacilli stains were negative for all patients; however, the results of tissue or swab cultures were positive in half of the patients. The majority of patients received systemic treatment with clarithromycin 500 mg twice a day, minocycline 100 mg twice a day, or azithromycin 250 mg once a day.<sup>19</sup>

Environmental outbreaks of atypical mycobacteria-infected tattoos are often limited to a solitary color of ink<sup>17</sup> and most commonly develop 1 to 3 weeks following tattoo placement.<sup>17,19</sup> If atypical *Mycobacterium* infection is suspected, a biopsy for tissue culture and routine histology with stains (Ziehl-Neelsen stain, Fite stain) are recommended. Polymerase chain reaction can be



**Figure 4.** The patient showed complete clearing, though with resultant hypopigmentation after 4 months of therapy with clarithromycin 500 mg taken orally twice a day.

used for identification of the organism, though it is not a considered first-line laboratory test in the diagnostic process.<sup>19</sup>

Minocycline, azithromycin, tobramycin, clarithromycin, amikacin, linezolid, and tigecycline have all been described for the treatment of tattoos complicated by atypical mycobacteria infections. In the various case series listed above, the most common first-line antibiotic therapy was with clarithromycin or minocycline. Of note, *M chelonae* resistance to clarithromycin has been reported. Systemic antibiotics for 6 months or longer may be needed for optimal clearance of atypical mycobacteria-infected tattoos.<sup>19</sup>

Our patient developed an atypical mycobacteria infection from suspected dilution of tattoo pigment by tap water. Our case was unusual with a more prolonged time before clinical presentation. The patient's initial course also was complicated by a secondary infection with MRSA, thus making the underlying condition a diagnostic dilemma. To facilitate a timely diagnosis, a high index of suspicion for atypical mycobacteria must be maintained when encountering inflammatory papules, plaques, nodules, and pustules in the distribution of a tattoo. We believe that the use of topical and/or systemic steroids should be avoided until an accurate diagnosis is obtained.

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