Development of Sarcoidosis in Cosmetic Tattoos

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Background: The development of granulomatous lesions within tattoos is a well-recognized occurrence in individuals with sarcoidosis. The characteristic histopathological finding of sarcoidosis is the presence of noncaseating granulomas; however, similar histopathological findings may be seen in foreign body granulomas. Several reports have challenged the assertion that the presence of foreign material within sarcoidal granulomas is incompatible with a diagnosis of sarcoidosis.

Observations: We describe a patient who had multiple linearly arranged papules along her eyebrows and the vermilion border of her upper lip. She had had cosmetic tattooing performed on these areas 3 years prior to presentation. Histopathologic examination revealed sarcoidal granulomas, polarizable foreign material, and pigment granules. Hilar adenopathy was noted on a chest radiograph. After 4 months of treatment with a midpotency topical steroid and doxycycline, she experienced complete clearance of her cutaneous lesions and normalization of chest x-ray film findings.

Conclusions: This case demonstrates a unique adverse result after cosmetic tattooing and highlights the concept that granulomatous histopathologic findings containing foreign material should not be an exclusionary criterion for the diagnosis of sarcoidosis. In this setting, further investigation for the presence of systemic disease is indicated.

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Sarcoidosis is a granulomatous disease of unknown etiology, which may affect multiple organ systems. The skin is reported to be involved in up to one third of patients with sarcoidosis. Cutaneous lesions may be the only clinical manifestation of the disease, and, thus, a skin biopsy may aid in the diagnosis of this systemic disorder. The characteristic histopathologic finding of sarcoidosis is the presence of noncaseating granulomas; however, similar histopathologic findings may be seen in foreign body granulomas. White has suggested that the presence of polarizable foreign material within sarcoidal granulomas is incompatible with a diagnosis of sarcoidosis. Several reports strongly challenge this concept, citing the not-infrequent occurrence of foreign material within biopsy specimens of lesions that are histopathologically and clinically consistent with sarcoidosis in patients with known systemic sarcoidosis. Ball et al reported identifying birefringent foreign material in 50% of cutaneous biopsy specimens obtained from individuals with known systemic sarcoidosis. The development of cutaneous lesions within tattoos is a well-recognized occurrence in patients with sarcoidosis. We report a case of sarcoidosis that developed within cosmetic tattoos placed for the purpose of permanent makeup.

See also page 918

A 41-year-old woman complained of a 2-month history of asymptomatic lesions on her eyebrows and lips. She had had cosmetic tattooing of these areas 3 years prior to presentation. She also described the onset of shortness of breath beginning when her cutaneous lesions developed. She denied having other symptoms. Her medical history was significant for hypertension. She had no history of tuberculosis. On physical examination she was found to have multiple translucent flesh-colored papules arranged linearly along her eyebrows and the vermilion border of her upper lip.
She also developed a nodular lesion involving previously healthy skin on her forearm, the histopathologic findings of which showed sarcoidal granulomas without evidence of a foreign body. Biopsy findings from 1 of the papules on her eyebrow revealed sarcoidal granulomas and scattered pigment granules (Figure 2). Findings on a subsequent chest x-ray film revealed prominent bilateral hilar adenopathy (Figure 3A). Pulmonary function testing and ophthalmologic examination results were unremarkable. The patient was started on a regime of mid-potency topical corticosteroid and doxycycline hyclate, 100 mg, twice a day. After 4 months of this therapy, she experienced complete clearance of her cutaneous lesions (Figure 1B), resolution of her pulmonary symptoms, and normalization of her chest x-ray film (Figure 3B). At her 8-month follow-up, she was not receiving any therapy, and she remains without relapse.

COMMENT

In 1955, Obermayer and Hassen\textsuperscript{7} reported the first case of a sarcoidal reaction within a tattoo attributed to be a manifestation of systemic sarcoidosis. Since that time, multiple cases have been described, most occurring in association with hilar adenopathy and pulmonary sarcoidosis (Table).\textsuperscript{7-22} In 14 of 19 cases, the tattoo reactions subsequently led to the diagnosis of systemic sarcoidosis. These cutaneous reactions have been reported to occur in multiple colors of multipigment tattoos as well as to be limited to a single color of multipigmented tattoos. While involvement of a single pigment may suggest the presence of an allergic response to a pigment, this is not a reliable finding on which to exclude a diagnosis of cutaneous sarcoidosis.

We report the first case of systemic sarcoidosis presenting with sarcoidal granuloma formation complicating cosmetic tattooing for the purpose of permanent makeup. This diagnosis is supported by the findings of hilar adenopathy and a cutaneous nodule on previously healthy skin, which on histopathologic examination revealed sarcoidal granulomas without identifiable foreign material. Yesudian and Azurdia\textsuperscript{21} reported a case of cutaneous sarcoidosis occurring on the lips after cosmetic tattooing in a woman with a known history of systemic sarcoidosis. Their patient was successfully treated with hydroxychloroquine sulfate and mepacrine. A simi-
lar complication of cosmetic tattooing reported by Yang et al involved the eyebrows in 2 women; however, these subjects did not undergo evaluation for systemic sarcoidosis, and their cutaneous findings were attributed to allergic granuloma formation.

The case presented herein and others highlight the concept that granulomatous histopathologic findings with evidence of foreign body material should not be considered exclusionary criteria for the diagnosis of sarcoidosis. One might consider what role foreign material plays in the pathogenesis of sarcoidosis. Its presence may act as a stimulus in an individual genetically susceptible to the development of sarcoidosis. Chronic low-grade exposure of the immune system to an antigenic substance

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**Table. Reported Cases of Sarcoidal Tattoo Reaction as a Manifestation of Systemic Sarcoidosis**

<table>
<thead>
<tr>
<th>Source</th>
<th>Case No.</th>
<th>Involved Pigment</th>
<th>Extracutaneous Findings</th>
<th>Time Lapse, y*</th>
<th>Presenting Manifestation of Systemic Sarcoidosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lubeck and Epstein, 1952</td>
<td>1</td>
<td>Green, red, blue</td>
<td>Hilar adenopathy, iritis, arthritis</td>
<td>NA</td>
<td>No</td>
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<tr>
<td>Obermayer and Hassen, 1955</td>
<td>2</td>
<td>Red, blue</td>
<td>Hilar and peritracheal adenopathy</td>
<td>10</td>
<td>Yes</td>
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<tr>
<td>Weidman et al, 1966</td>
<td>3</td>
<td>Red, blue</td>
<td>Hilar adenopathy</td>
<td>45</td>
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<tr>
<td>Rorsman et al, 1969</td>
<td>4</td>
<td>Blue</td>
<td>Uveitis</td>
<td>None</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Blue, yellow</td>
<td>Uveitis</td>
<td>None</td>
<td>Yes</td>
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<tr>
<td></td>
<td>6</td>
<td>Blue</td>
<td>Uveitis, erythema nodosum</td>
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<td>Yes</td>
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<tr>
<td>Dickinson, 1969</td>
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<td>Red, blue, green</td>
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<td>Yes</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Red</td>
<td>Hilar adenopathy</td>
<td>11</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Red, brown, green</td>
<td>Hilar adenopathy, osteitis</td>
<td>13</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Green</td>
<td>Hilar adenopathy, arthritis, erythema nodosum</td>
<td>22</td>
<td>No</td>
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<tr>
<td>Hanada et al, 1985</td>
<td>11</td>
<td>Red</td>
<td>Pulmonary sarcoidosis, uveitis, adenopathy</td>
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<td>Blobstein et al, 1985</td>
<td>12</td>
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<td>Colp et al, 1991</td>
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<td>Sowden et al, 1992</td>
<td>14</td>
<td>Red</td>
<td>Hilar adenopathy, arthritis, erythema nodosum</td>
<td>15</td>
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<tr>
<td>Collins et al, 1994</td>
<td>15</td>
<td>Blue</td>
<td>Pulmonary sarcoidosis</td>
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<td>Yes</td>
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<tr>
<td>Jones et al, 1997</td>
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<td>Black</td>
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<td>Nawras et al, 2002</td>
<td>17</td>
<td>NA</td>
<td>Hilar adenopathy, pulmonary sarcoidosis</td>
<td>NA</td>
<td>No</td>
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<tr>
<td>Yesudian and Azurdia, 2004</td>
<td>18</td>
<td>Brown</td>
<td>Hilar adenopathy</td>
<td>2</td>
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<td>Werczniak et al, 2004</td>
<td>19</td>
<td>Multiple</td>
<td>Hilar adenopathy</td>
<td>&gt;30</td>
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</tbody>
</table>

Abbreviation: NA, information not available.

*Time-lapse from tattoo placement to onset of sarcoidal reaction.

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Figure 3. A, Chest x-ray film obtained at presentation shows prominent bilateral hilar adenopathy; B, follow-up chest x-ray film obtained after a 4-month treatment period shows normalization of the bilateral hilar adenopathy.
in the foreign material might ultimately lead to systematized granulomatous hypersensitivity. This concept is supported by the long latency period that is seen in many cases between the time of tattoo placement and the time a sarcoidal reaction develops. In 1 report\(^6\) of sarcoidal tattoo reaction, similar red and black tattoo pigments were identified by electron microscopy in concomitant pulmonary sarcoidal granulomas. Although foreign material is commonly absent on histopathologic examination, the rate of occurrence of foreign bodies in sarcoidal granulomas is likely to be underestimated secondary to sampling errors and instances in which the foreign material present is undetectable by polarization.

This case represents a unique adverse result after cosmetic tattooing, the incidence of which might be expected to rise considering the increasing popularity of cosmetic procedures and tattoo adornment. We stress that such reactions to tattoos may be the only manifestation of systemic disease, thus warranting further investigation for evidence of systemic sarcoidosis. Finally, this presentation lends support for the treatment of cutaneous sarcoidosis with tetracyclines, as has been previously described.\(^{24}\)

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**Disclaimer:** Dr Callen had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Additional Information:** Dr Callen is the Associate Editor for Archives of Dermatology. He was not involved in the editorial evaluation or editorial decision to accept this work for publication.

## REFERENCES


