Ink & Eye: A Case Report on Tattoo-Associated Uveitis

Tinta e Olho: Caso Clínico de Uveíte Associada a Tatuagem

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ABSTRACT

Tattoo-associated uveitis is a condition where an inflammatory response in the eye is triggered by tattoo ink. This report describes a 33-year-old man with bilateral recurrent uveitis, as well as indurated regions of elevated tattooed skin and pruritus, 6 months after receiving multiple black ink tattoos. Initial treatment with topical corticosteroids and nonsteroidal anti-inflammatory drugs provided relief, but symptoms recurred after discontinuation of therapy. Diagnostic workup ruled out common infectious and autoimmune causes, as well as systemic sarcoidosis. A biopsy of the tattooed skin confirmed granulomatous inflammation, suggesting a hypersensitivity reaction to the ink. The patient's condition improved with a revised oral corticosteroid regimen over eight months of follow-up, and he remains under close monitoring due to the risk of recurrence. This case underscores the importance of considering tattoo-related inflammation in cases of unexplained uveitis, particularly in patients with recent tattoo work.

KEYWORDS: Tattooing/adverse effects; Uveitis/drug therapy; Uveitis/etiology.

RESUMO

A uveíte associada a tatuagens é uma patologia na qual a tinta de tatuagem desencadeia uma resposta inflamatória ocular. Este caso descreve um homem de 33 anos com uveíte bilateral recorrente, além de prurido, endurecimento e elevação da pele tatuada, seis meses após a realização de múltiplas tatuagens com tinta preta. O tratamento inicial com corticoterapia e AINEs proporcionou melhoria clínica, mas os sintomas recidivaram após a suspensão. Exames diagnósticos excluíram causas infecciosas, autoimunes e sarcoidose sistémica. Uma biópsia dérmica revelou inflamação granulomatosa sugestiva de reação de hipersensibilidade à tinta. O quadro clínico melhorou com a revisão terapêutica ao longo de oito meses de seguimento, mantendo-se o doente sob vigilância devido ao risco de recorrência. Este caso sublinha a importância de considerar a inflamação associada a tatuagens como diagnóstico diferencial na uveíte de etiologia indeterminada, especialmente em pacientes com tatuagens recentes.

PALAVRAS-CHAVE: Tatuagens/efeitos adversos; Uveíte/etiologia; Uveíte/tratamento farmacológico.

INTRODUCTION

Tattoo-associated uveitis is a rare but increasingly recognized condition where ocular inflammation, specifically uveitis, is linked to granulomatous reactions in tattooed skin. First described in a case series in 1952,[1] fewer than 50 cases have been added to the literature,[2] though reporting has increased in the past decade. Patients typically present with bilateral anterior uveitis or panuveitis, and non-caseating granulomas, sometimes containing tattoo pigment, localized to the tattooed areas of the skin. These granulomas, histopathologically similar to those seen in sarcoidosis, suggest a shared immunopathological mechanism. Indeed, some cases of tattoo-associated uveitis are linked to systemic sarcoidosis, while others remain isolated, highlighting the complexity of the underlying pathophysiology.[3]

The exact etiology of tattoo-associated uveitis remains uncertain, though two main hypotheses have been proposed.[4] The first suggests that the condition may represent a delayed-type hypersensitivity reaction to pigments or additives in tattoo ink in susceptible individuals.[5] The second hypothesis posits that a chronic antigenic response to the tattoo ink could induce a systemic granulomatous reaction consistent with sarcoidosis, particularly in those predisposed to the disease.[6]

Tattoo popularity and prevalence have risen significantly in recent years.[7,8] In 2016, an estimated 12% of Europeans were reported to have tattoos, and the figure is likely more than doubled in younger populations.[8] As this trend is expected to continue rising, it becomes increasingly imperative to consider tattoo-associated uveitis as a differential diagnosis in cases of unexplained ocular inflammation.

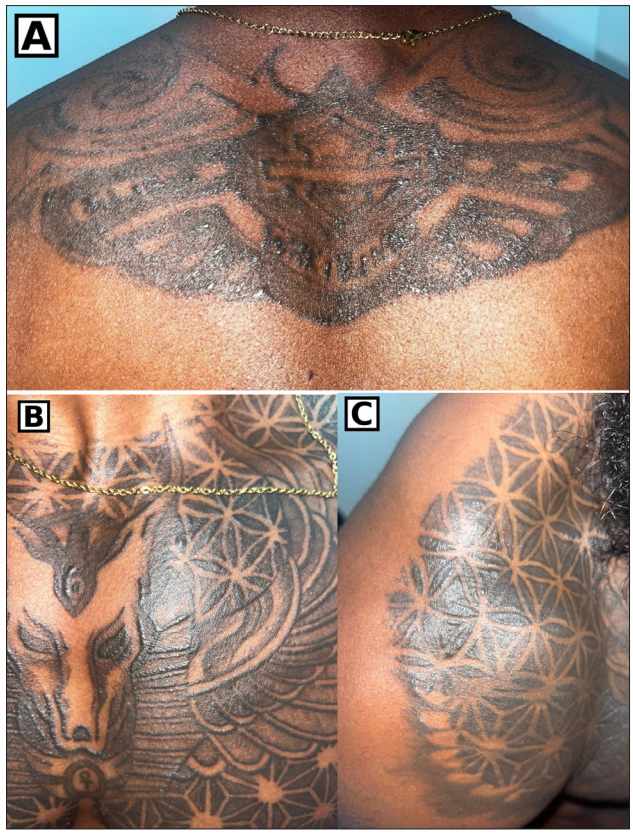


Figure 1. Clinical photographs of tattooed skin demonstrating a localized inflammatory response characterized by raised, thickened areas of tattooed skin, with unaffected surrounding non-tattooed skin. A - Upper back. B - Chest. C - Right shoulder.

CASE REPORT

A 33-year-old Angolan man, residing in Portugal for the past 4 years, presented to the Emergency Room (ER) with bilateral blurred vision and discomfort, particularly in the left eye, which had worsened over the past 3 weeks. His medical history was unremarkable, and he was not on regular medication. The patient reported receiving multiple tattoos approximately six months before presentation, and inflammation in the tattooed areas was first noticed a few weeks preceding the onset of ocular symptoms.

On examination, his visual acuity was 9/10 bilaterally, with intraocular pressure of 13 mmHg OD and 14 mmHg OS. Biomicroscopy of the left eye revealed periciliary conjunctival hyperemia, with fine endothelial keratic precipitates. Anterior chamber inflammation was classified according to the SUN criteria, with 2+ cells and no evidence of flare (grade 0) in OS. Dilated fundoscopy was normal. Physical examination showed multiple black ink tattoos on his upper arms, chest, and back, with indurated regions of elevated tattooed skin, with demarcated borders (Fig. 1).

He was treated with a regimen of tapering topical steroids, nonsteroidal anti-inflammatory drugs (NSAIDs) and mydriatics. A follow-up after one week showed symptomatic improvement and reduced inflammation. However, the patient missed the next follow-up appointment and returned to the ER with recurring symptoms, having discontinued treatment. At this visit, biomicroscopy revealed bilateral worsening inflammation with marked conjunctival hyperemia, diffuse fine keratic precipitates, and scattered mutton-fat precipitates. Anterior chamber inflammation had progressed to cell 3+, with slight flare (grade 1) and pigment on the anterior capsule due to apparent synechial rupture. Dilated fundoscopy revealed vitritis graded as 1+ anterior vitreous cells, with no observable changes in the posterior pole or peripheral retina. A new treatment regimen was initiated with oral steroid therapy.

To elucidate the etiology of the uveitis, a comprehensive diagnostic workup was conducted. Diagnostic tests included a complete blood count, electrolytes, renal and liver function tests, and inflammatory markers, all of which were normal except for a slight elevation in sedimentation rate (22 mm/hr). Immunological tests for HLA-B27, rheumatoid factor, ANA, and ANCAs were negative. Serologies for tuberculosis, toxoplasmosis, syphilis, and HIV were negative. Given the granulomatous nature of the inflammation and the differential diagnosis of sarcoidosis, further workup to rule out systemic involvement included ACE and calcium levels, which were normal, and a high-resolution chest computed tomography (CT) scan, which showed no signs of pulmonary involvement, such as lymphadenopathy or parenchymal changes.

Histopathological examination of a biopsy from the tattooed skin confirmed a granulomatous reaction with moderate lymphohistiocytic inflammation with multinucleated giant cells, of foreign body type, without histological features of sarcoidosis (Fig. 2).

The patient adhered to the revised treatment plan, showing a favorable response with marked improvement in both symptoms, anterior chamber inflammation, as well as tattooed skin inflammation. At 8 months follow-up the patient was stable without medical therapy.

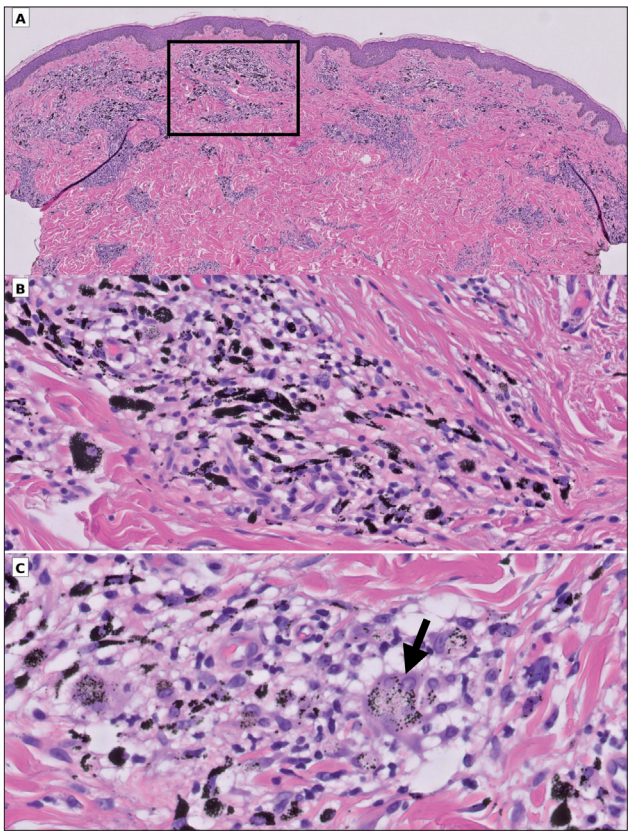


Figure 2. Histopathological examination of the cutaneous biopsy sample - Hematoxylin-eosin stain. A - Magnification 50x – The skin biopsy shows a perivascular inflammatory infiltrate in the superficial and mid-dermis (square). B - Magnification 400x – The infiltrate consists of lymphocytes and histiocytes, associated with abundant granular black pigment (from the tattoo). C - Magnification 600x – Occasional multinucleated giant cells of foreign body type (arrow) are present, with intracellular pigment.

DISCUSSION

This case illustrates the rare but significant link between tattoos and uveitis, underscoring the need for clinicians to consider tattoo-associated uveitis in cases of unexplained ocular inflammation.

The high prevalence of tattooing in Europe, affecting more than 60 million people, has increased notably in recent years,[7,8] with the incidence among women quadrupling over the past two decades and nearing parity with men.[7] This trend is driven by evolving social norms and the growing use of tattoos for cosmetic purposes, such as permanent makeup,[7,9] which has been associated with tattoo-associated uveitis.[10]

Notably, tattoo prevalence among younger adults is more than double that of older groups, suggesting a continued rise in this trend[8] and emphasizing the need for increased awareness of potential long-term ocular health implications in this demographic.

This case involved a patient with tattoo-associated uveitis, presenting 6-months after tattooing, fitting within the typical one-year timeframe for this condition.[3]

A recent study by van der Bent *et al* identified chronic inflammatory reactions to black tattoo ink as the second most common tattoo-related complication, with 7.1% presenting with tattoo-associated uveitis and 14.2% linked to systemic sarcoidosis. These reactions often serve as the first manifestation of disease, highlighting their potential as an early indicator of ophthalmic involvement.[11]

While sarcoidosis is known for its epidemiologic differences, with a higher prevalence among Northern European and African populations - the latter being more prone to extrapulmonary manifestations[12] - tattoo-associated uveitis has limited available data. Not all case reports of tattoo-associated uveitis specify ethnicity, but four documented cases involved Northern Europeans.[3] In the series by Ostheimer *et al*,[13] six of seven patients were of African descent, a trend also seen in the case series by Peterson *et al*,[14] where both patients were of African origin, as is the case of our patient.

Consistent with previous reports, patients without sarcoidosis are typically younger and are more likely to have black ink tattoos,[2,4] as seen in this case.

Identifying the antigenic trigger is challenging due to the unregulated production of tattoo inks, which are complex mixtures containing impurities such as dye contaminants, heavy metals, and other organic compounds. Over 100 colorants and additives are used, many of which are not specifically formulated for tattooing and often lack purity.[8,9] Most pigments remain unauthorized for cosmetic use and inadequately tested, with unsafe levels of restricted elements.[15] Despite these concerns, low-quality inks, many non-compliant with REACH regulations, are readily available in Europe.[8,16]

First-line treatment involves topical corticosteroid drops, however, in many cases, systemic oral prednisone is required, leading to improvement in both ocular and skin inflammation. To enable successful tapering of oral prednisone, initiation of immunosuppressive therapy, such as methotrexate or mycophenolate mofetil, has been described.[13,17,18] Before initiating immunosuppressive therapy, however, infectious etiologies such as tuberculosis and syphilis should be ruled out to avoid missing a diagnosis that could be exacerbated.

Although tattoo excision has been reported to alleviate uveitis in some cases,[20] evidence supporting its effectiveness in improving long-term outcomes is insufficient. Additionally, it is often not feasible for most patients, as many, including this case, have multiple tattoos, and removal

would necessitate extensive skin grafting. Furthermore, laser tattoo removal is also not an appropriate therapeutic strategy for most patients, as the dispersal of tattoo antigens into systemic circulation could theoretically exacerbate the underlying inflammatory response or even trigger a severe allergic reaction.[21]

Tight monitoring is essential in these patients to manage potential complications, including iris bombe, pupillary membranes, and cystoid macular edema.[13] Additionally, there is a high likelihood of recurrence,[19] further emphasizing the need for ongoing surveillance, with some patients requiring lifelong immunosuppression for severe or recurrent disease.

Clinicians should consider tattoos as a potential cause of unexplained uveitis, particularly when standard diagnostics fail to reveal common causes like sarcoidosis or infections. Tattoo-associated uveitis, as seen here, often presents with both ocular and skin inflammation, a connection patients may overlook. Through open-ended questions about tattoo history and related symptoms, clinicians can uncover valuable diagnostic clues that might otherwise be missed.

This case reinforces that - even in an era of advanced diagnostic tests and imaging - the importance of thorough history-taking in uveitis remains irreplaceable. Taking the time to engage with patients and ask detailed questions can reveal critical insights that modern technology alone may overlook. Ultimately, it reminds us that as tattoos are permanent, due to their impact on our eyes, our vigilance and care must be equally enduring.

CONTRIBUTORSHIP STATEMENT / DECLARAÇÃO DE CONTRIBUIÇÃO

DC: Data collection, literature review, and manuscript writing.

JC: Data collection.

LR, SF: Review of the final manuscript.

All authors collaborated equally in patient evaluation, diagnosis and management, data collection for the article and discussion of results. All authors approved the definitive version of the article to be published.

DC: Recolha de dados, revisão bibliográfica e escrita do manuscrito.

JC: Recolha de dados.

LR, SF: Revisão do manuscrito final.

Todos os autores colaboraram igualmente na avaliação do doente, diagnóstico e abordagem terapêutica, na recolha de informação para o artigo e discussão de resultados.

Todos os autores aprovaram a versão final do artigo para publicação.

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