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SHORT REPORT

Pin site allergic contact dermatitis: an unusual complication of halo fixation

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Abstract

We report a case of halo pin site allergic contact dermatitis, a rare complication of halo vest immobilisation (HVI), necessitating device removal. Although uncommon, pin site allergic contact dermatitis should be considered in patients who develop an acute dermatitis within hours to days of HVI application.

Keywords: halo vest immobilisation; contact dermatitis; vanadium; allergy

Clinical details

A 52-year-old gentleman presented with a neck injury following a motor vehicle accident. Examination revealed some upper cervical tenderness but no neurological deficit. A computed tomography (CT) scan demonstrated an undisplaced fracture through the occipital condyle and subluxation of the left occipito-cervical joint (Fig. 1). A decision was made to treat the patient with HVI and follow-up with CT scanning of the region at intervals to assess union and alignment. A PMT Halo System, 1200 Series [PMT Corporation, Chanhassen, MN], was fitted with four titanium alloy fixation pins used to stabilise the crown, placed at standard anatomical landmarks. There was no evidence of inflammation on the skin prior to this and no breaks or abrasions to the scalp secondary to the accident.

Within 72 hours of applying the halo, the patient developed bilateral periorbital oedema, progressive facial swelling and a dermatitis surrounding all four of the halo pin sites (Fig. 2). The pins were not found to be loose or altered in position. Microbiological swabs of a forehead pin site serous wound discharge were obtained and intravenous antibiotics (2 g of Flucloxacillin, four times daily) were commenced as cover against a possible pin site infection. Blood tests were significant for a C-reactive protein of 180 mg/L but were otherwise normal. The acute nature and subsequent poor clinical response to antibiotics raised the suspicion of an allergic type reaction. A decision to remove the halo was taken after

5 days, which subsequently facilitated a prompt resolution of the patient's symptoms. The wound discharge was negative on gram stain and no organisms were grown on culture suggesting this was not a bacterial infection. A Lerman brace was fitted as an alternative means of immobilisation and the patient was discharged home and followed-up in clinic.

Outpatient skin patch testing to a series of metals including titanium, revealed a positive reaction to vanadium, an element found in the titanium alloy (Ti-6-Al-4V) from which the halo pins were manufactured, supporting a diagnosis of contact dermatitis. At 3 months, the patient demonstrated bony union at the site of the injury on follow-up CT scan.

Discussion

Since its inception in 1959, the halo orthotic fixation device has played an integral role in stabilising the injured cervical spine. Despite having high union rates and being relatively well tolerated by patients, halo fixation of the cervical spine is nevertheless associated with a significant rate of complications, both minor and severe, including: nerve injury, dysphagia, pin loosening, halo migration, loss of reduction, pin site infection, osteomyelitis, cranial penetration, intracranial infections and respiratory decline. The majority of complications are easily managed and will not lead to failure of treatment.

Pin site infection represents a common complication of HVI with reported rates of between 8% and 36%.¹ Pin site infection often produces a reactive dermatitis but typically manifests several weeks following application of the frame. The acute nature and uniform distribution of our patient's reaction around all four pin sites was felt to be atypical of infection and raised a clinical suspicion of contact dermatitis. Although we commenced antibiotics in our patient, it was the removal of the pins, which appeared to prompt recovery supporting our suspicions, and further investigation with skin patch testing confirmed a positive reaction to vanadium, an element found in the titanium alloy from which the fixation pins were manufactured.



Fig. 1. Sagittal CT scan demonstrating subluxation of the left occipito-cervical joint.

The development of symptoms in our patient over a 2 to 3-day period is compatible with a type IV hypersensitivity reaction via a cell mediated response to an allergen, in this case, vanadium. In the context of HVI, contact dermatitis is more commonly observed on the trunk secondary to a reaction to lanolin in the lamb's wool, which often lines the vest. The halo frame's 50-year history has seen many changes to its components including the fixation pins. Newer materials such as ceramics, claiming improved biocompatibility and imaging capabilities are unfortunately not yet free of complication.² The traditional metallic pins composed of stainless steel, titanium alloys and other metals are consequently still favoured by many and are in widespread use. The prevalence of metal allergy in the general population is relatively high and has been associated with medical device failure in cases of intracoronary stents, hip and knee prostheses as well as other implants.³ To our knowledge, this is the first reported case of halo pin site contact dermatitis secondary to vanadium allergy necessitating removal of the device.

Pin site allergic contact dermatitis is an unusual complication of HVI, but one which should be considered in patients who develop an acute dermatitis within hours to days of halo frame fixation. In such cases, we advocate prompt removal of the pins to facilitate recovery, the utilisation of an alternative



Fig. 2. Image of the patient following removal of the halo frame after 5 days, demonstrating a contact dermatitis around the forehead pins sites and periorbital oedema, which subsequently resolved

pin material or alternative means of immobilisation and skin patch testing to diagnose allergy.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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