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Hypersensitivity to orthopaedic implant manifested as erythroderma: Timing of implant removal☆

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ABSTRACT

INTRODUCTION: Incidence of hypersensitivity to orthopaedic implant, once estimated in less than 1% of population, recently has increased to 10%. Controversies about the timing of implant removal remain, especially due to the fact that implant hypersensitivity may be a contributing factor to implant failure. We present a case report and literature reviews to establish the decision making for the timing of implant removal in the presence of implant hypersensitivity.

PRESENTATION OF CASE: Female, 42 years old with nonunion of mid-shaft tibia and fibula which was treated with ORIF with conventional SAE16 stainless steel plate and bone graft. A week after, she developed a generalized rash, which is later diagnosed as erythroderma, that relapsed despite adequate systemic corticosteroid. Poor healing of surgical site wound were marked. After the implant removal, the cutaneous condition improved and no relapse were found.

DISCUSSION: Management of hypersensitivity to implants involved corticosteroid administration, removal or replacement of implants, or implants coating with polytetrafluoroethylene. Currently there are no specific guidelines regulating the management of implant allergy based on the timing of the onset, especially in fracture cases. The decision-making would be straightforward if union was already achieved. Otherwise, controversies would still occur. In this paper, we proposed an algorithm regarding the steps in managing metal allergy due to implant in fracture cases.

CONCLUSION: Despite the concerns regarding implant survival in hypersensitivity cases, the decision whether the implant should be removed or replaced should be based on the time and condition of the fracture healing process.

1. Introduction

The incidence of hypersensitivity to orthopaedic implant is relatively high in general population. Once, the incidence was estimated to be less than 1% of population, but now it has reached around 10–17% of general population [1–4]. The main concern of implant hypersensitivity were whether it might affect implant survival [2,3]. As it still remains a controversial issue, many researchers have concluded that implant hypersensitivity may be a contributing factor to implant failure due to shorter lifespan of implants in patients with positive patch reaction to metal [5,6]. We presented a case of implant hypersensitivity which was treated by watchful observation with low dose corticosteroid to control the skin lesions. This paper has been reported in line with the SCARE criteria [7].

2. Case presentation

Forty-two years old female came to our outpatient clinic with 9-month-neglected fracture of her right shaft tibia and fibula. She had a motor vehicle accident previously and had a closed fracture of her tibia and fibula. Then she was treated by a bonesetter for 9 months with no significant result. There were no comorbidities and she was mobile (using a crutch). On initial examination, there was no skin defect or signs of infection at the fracture site. Radiograph showed well-demarcated oblique fracture line at the middle shaft of her tibia and fibula, suggesting a nonunion. After that, a decision was made to treat the tibia with open reduction and internal fixation using a conventional narrow plate and standard anterior

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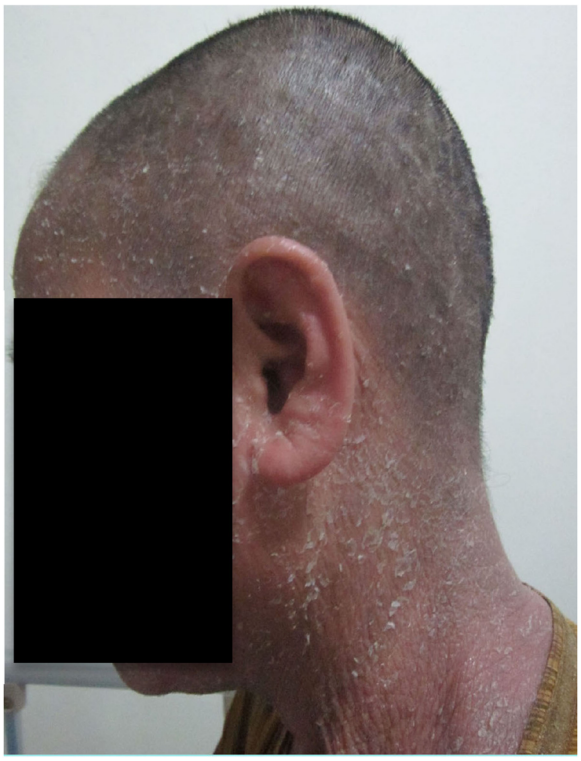

Fig. 1. Generalized scaly erythema on head and neck one week after surgery.

tibia approach. Removal of the intervening fibrosis and preparation of non-union fracture site was performed in surgery, as well as autologous bone grafting harvested from the iliac crest.

A week after surgery, extensive skin lesions developed on her scalp, trunk, upper and lower extremities especially around the surgical wound. Skin examination showed generalized scaly erythema (exfoliative dermatitis with diffuse skin involvement and ill-defined margin) as showed on Fig. 1. The patient was consulted to the dermatologist and was diagnosed as psoriatic erythroderma. By that time, the information about her history of metal allergy (ear pierces) was obtained. Systemic corticosteroid (methylprednisolone 2 mg/day) was administered to treat the lesions and the patient responded well to the treatment after several days. The surgical wound healed well and the suture was removed 14 days after surgery.

But a week after the suture removal, the erythroderma relapsed and wound dehiscence occurred along the previous surgical incision (Fig. 2). There was no sign of infection such as pus at the surgical wound. The white blood count was still within normal limit despite some elevation in ESR and CRP. After discussion the dermatologist, we decided to observe the fracture healing or implant loosening by serial plain radiograph examinations, (AP and lateral view of the cruris every 4 weeks) while treating the skin lesions with topical (triamcinolone cream 0.025%) and low dose systemic steroid (methylprednisolone) to control the skin eruption. The steroid administration was intermittent, as a dosage of 2 mg/day was given during the relapse and was tapered off to 0,5 mg/day (maintenance dose) in a week after the resolution of skin lesions. Oral calcium and calcitriol supplements were also given throughout the course of treatment. The wound was treated using moist dressings until re-epithelization was achieved. During the observation period, the risk for secondary complications such as infection, fluid-electrolyte imbalance, and thermoregulatory disturbance, were carefully monitored.

Eight weeks after the surgery, as the callus were visible from radiological examination, a decision was made to preserve the plate

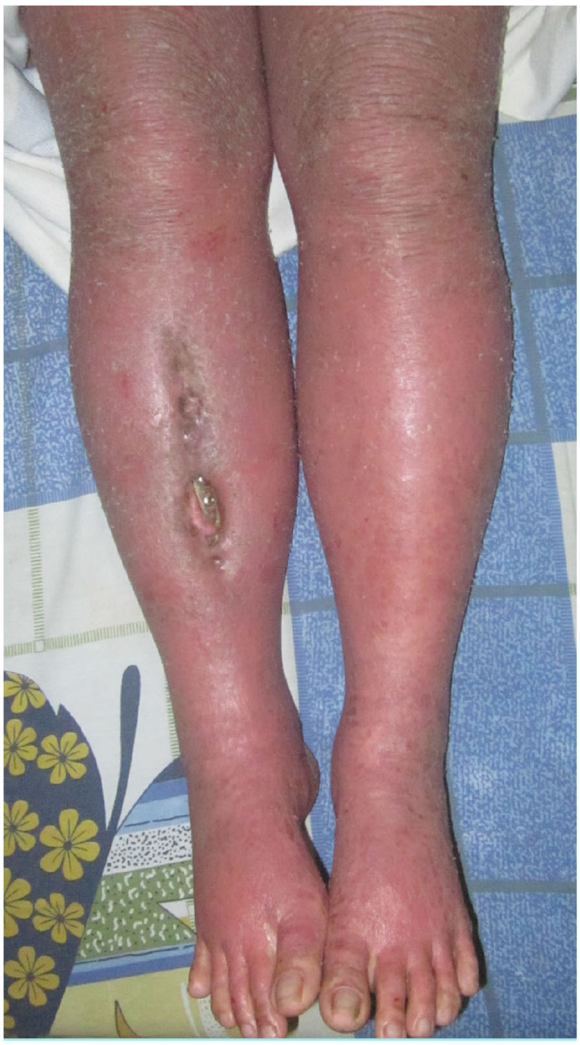

Fig. 2. Generalized erythema on both legs with surgical wound breakdown of the right tibia.

fixation until more calluses were produced and clinical union was achieved. During seven months of postoperative follow-up, the patient had five relapses (including the two previously-mentioned incident), which resolved in several days (7–10 days) after the low dose steroid treatment.

Seven months after surgery, the plate was removed and a week later, the skin condition improved (Fig. 3). At the last follow up (one year after implant removal), no further relapse occurred, complete union was achieved and the patient had completely returned to her daily activities.

3. Discussion

Hypersensitivity due to orthopaedic implants usually manifested as poor wound healing, local reaction and rarely systemic dermatitis reaction [3,4]. Our case matched 6 of 9 criteria to diagnose hypersensitivity due to metal (chronic dermatitis beginning weeks to months after metallic implantation, eruption overlying implant, morphology consistent with dermatitis, systemic allergic dermatitis reaction in rare instances, dermatitis resistant to therapy and complete recovery after removal of the offending implants) [8]. Women are more susceptible to metal hypersensitivity. Verma et al. reported that in 28 cases of metal hypersensitivity after TKA, 23 of