

Allergic reaction to stainless steel sternotomy wires requiring removal: A case report and literature review

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SUMMARY

Hypersensitivity to stainless steel sternal sutures are an uncommon occurrence. We present a case of such a patient who developed chronic tissue overgranulation over a sternotomy wound eight weeks post-operatively. Primary suspicion was infection, a more common complication however radiological and laboratory investigation showed otherwise. Conservative management provided limited ephemeral success. After ensuring adequate sternal bone healing, the sutures and granulation tissue were eventually surgically removed without complication and the reoperated wound healed well.

KEY WORDS:

Sternotomy wound, Overgranulation

INTRODUCTION

Stainless steel sutures, composing of chromium and nickel are widely used for sternal wounds due to its characteristics of having high tensile strength, minimal reactivity to tissues and is a non-absorbable suture. Allergic reactions to stainless steel sternal suture wires are very rare, especially in a patient with no known hypersensitivities to metal due to its inert nature. In this report, we present such a case of hypersensitivity.

CASE REPORT

A 53 year old Chinese male arteriopath presented 8 weeks following elective coronary artery bypass graft (CABG) surgery with tissue overgranulation along his sternotomy incision. His cardiovascular risks were hypertension, dyslipidaemia, obesity, smoking and Type II diabetes mellitus. He underwent an uneventful triple bypass for symptomatic coronary artery disease (CAD) and made a good recovery. During routine follow up, his sternal wound was stable and well healed.

Eight weeks post operatively, the patient was noted to have several eruptions along his sternotomy wound with excessive granulation tissue (Figure 1). An incisional drainage yielded no pus and the patient was afebrile with normal inflammatory markers.

For three and a half months, the patient was regularly followed-up at the cardiothoracic clinic where he was treated

with several courses of empirical antibiotics, regular dressings and two further attempts at incisional drainage, however he showed no improvement. During this period further lesions erupted intermittently at different sites, healing and reappearing along the sternotomy wound. His inflammatory markers remained normal and multiple swabs taken were negative. Clinically and radiologically his sternum was intact (Figure 2). A plastic surgical opinion was sought. A trial of dressings with gold dust and chemical cauterization using silver nitrate sticks had limited success with transient attenuation of the excessive granulation tissue.

Eventually, the sternal wires were removed as it was the most likely cause of the local tissue reaction, particularly as the periodic eruptions correlated with the location of the sternal wires. The surgery was performed five months following his CABG. All seven sternal wires were removed and appeared intact with no evidence of corrosion. There was no frank pus but a generous soft tissue debridement was performed and the wound was closed with bilateral pectoralis major partial advancement flaps. The patient made an excellent recovery and his sternal wound appeared well healed three months post-surgery. Granulation tissue and bone tissue sent for analysis revealed no growth.

DISCUSSION

We postulate that the persistent and excessive sternal wound granulation in this patient was due to a hypersensitivity reaction to his sternal wires. The wires used were standard ETHICON 316L Surgical Stainless Steel; an alloy of nickel and chromium. Admittedly, an allergic reaction to sternal wires is extremely rare especially in patients with no known allergy to metals.

Our patient was initially treated empirically for an infection as it was a more likely cause with a reported incidence of 1.8%.¹ In retrospect, an infective etiology seems less likely as his wound healed satisfactorily initially and he only presented seven weeks following the CABG procedure, with normal inflammatory markers and negative wound cultures. Clinically, his sternum was well healed with no instability or "click" on movement and radiologically there was no sign of dehiscence with all seven wires intact.

Our patient reported no previous hypersensitivities to metal however he has a known allergy to penicillin, seafood and

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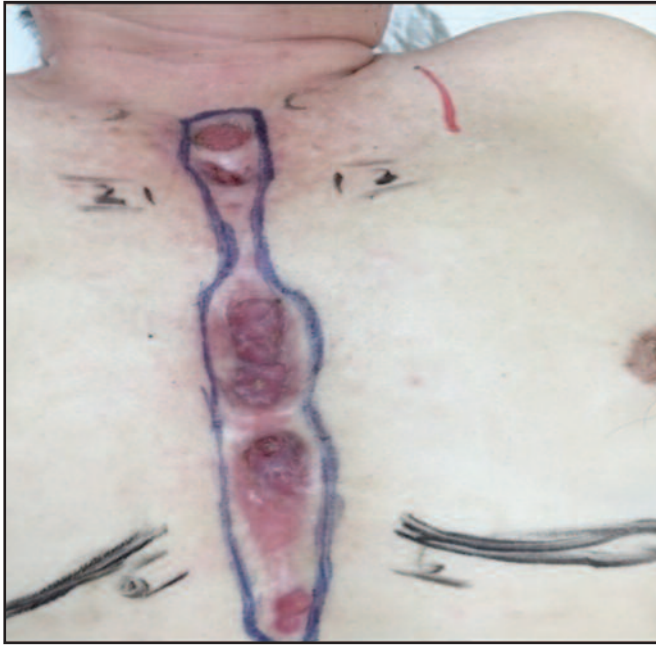


Fig. 1: Eruptions along the sternotomy wound due to overgranulation.

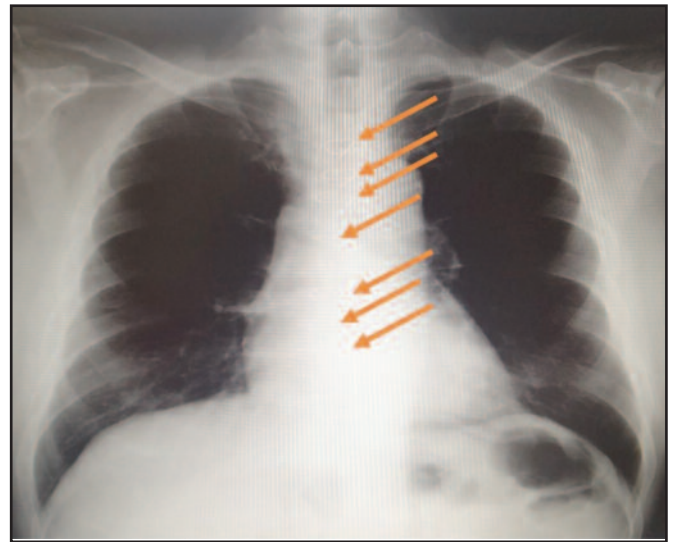


Fig. 2: Chest radiograph demonstrating intact sternal wires.

had previously developed blisters around his surgical plasters. He also has eczema which flared up prior to surgery. He denied the use of ointments, creams or traditional medicines that could have precipitated the reaction. Though there is little evidence to suggest a correlation between his known hypersensitivities to the development of such an allergic reaction, it may prove helpful for the surgeon to be aware of the possibility in patients with a similar background history. Had the possibility of developing an allergic reaction to the wires been suspected, skin patch testing may have been beneficial in explaining the cause of his symptoms.

Even in patients who are not allergic, chromium and nickel have a rate of sensitization of 2.7% and 3.8% respectively however many studies done show conflicting results.² Should an allergy to stainless steel be known or suspected, alternative methods of sternal closure include a “Titanium Sternal Fixation System” or “Sternal Talon”, both made from Titanium.

Overgranulation as seen in our patient can be attributed to continual minor trauma or external friction, overuse of occlusive dressings, allergic reactions, malignancy, cellular imbalance or other chronic medical disorders and the appropriate approach is to first attempt to identify the cause. As hypergranulation is normally transient, the “wait and see” method may be most effective. Otherwise, reduction may be accomplished by removal of external causes of friction, non-traumatic or foam dressings, light pressure application, chemical cautery with silver nitrate sticks, topical corticosteroids or Haelan tape. As seen in this case, non-resolving hypergranulation may eventually require surgical debridement.³

Despite its limited success, the trial of conservative strategies with this patient allowed sufficient time for adequate sternal bone healing to facilitate safe wire removal. Complete sternal bone healing takes a mean of 10.4 weeks⁴ and premature removal may precipitate sternal dehiscence or malunion resulting in chronic discomfort and functional disability. Ultimately, the wires were removed five months post CABG as the reaction was unlikely to subside otherwise.

CONCLUSION

In the absence of obvious infection, the surgeon must thoughtfully consider the possibility of a sternal wire reaction albeit extremely rare, in any patient who presents late with a chronic non-healing yet stable overgranulating sternotomy wound. An initial trial with conservative therapies is justified and provides adequate time for essential bony union however ultimately, surgical removal of the wires with concomitant debridement and/or reconstruction may be required. If there is clinical suspicion of an allergy, patch testing would ideally help identify the cause of such a presentation.

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