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Case Report

Minimally Invasive Coronary Bypass in a Patient with Metal Allergy

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ABSTRACT

Patients with metal allergy represent a challenge for current surgical techniques, particularly minimally invasive ones, in which metal implants are routinely used to facilitate procedures. We report on a 60-year-old woman with metal allergy who presented with non-ST elevation myocardial infarction, and in whom we performed minimally invasive coronary artery bypass via small thoracotomy. In conclusion, we show that minimally invasive coronary surgery might feasibly be done without the aid of metal implants or surgical clips for hemostasis.

RÉSUMÉ

Les patients ayant une allergie au métal représentent un défi pour les techniques chirurgicales courantes, particulièrement les chirurgies minimalement effractives, où les implants métalliques sont régulièrement utilisés pour faciliter les interventions. Nous rapportons le cas d'une femme de 60 ans ayant une allergie au métal qui a subi un infarctus du myocarde avec sus-décalage du segment ST, et chez qui nous avons pratiqué un pontage aortocoronarien minimalement effractif par petite thoracotomie. En conclusion, nous montrons que la chirurgie coronarienne minimalement effractive serait vraisemblablement réalisable sans implants métalliques ni clips chirurgicaux d'hémostase.

Patients with metal allergy represent a challenging situation for current surgical techniques in which metal implants are used to facilitate efficient procedures. We report on a 60-year-old woman with metal allergy who presented with non-ST elevation myocardial infarction (NSTEMI), and in whom we performed minimally invasive coronary artery bypass via small thoracotomy.

and metal allergy), the patient was referred for minimally invasive (MICS) coronary artery bypass grafting (CABG) with the left internal thoracic artery (LITA) anastomosed to the

Case Report

A 60 year-old woman presented with NSTEMI and high-grade stenosis of the left anterior descending (LAD) coronary artery. Her medical history was notable for the presence of multiple allergies, including documented metal allergy. This had previously manifested with rashes, urticaria, and mucosal swelling shortly after she had undergone abdominal hysterectomy with the use of surgical clips. On objective testing, it was diagnosed that she had an allergy to nickel and titanium. Her symptoms were not controlled with medication and she required repeated laparotomy with explantation of all surgical clips.

In the setting of NSTEMI with LAD disease not amenable to percutaneous coronary intervention (because of anatomy

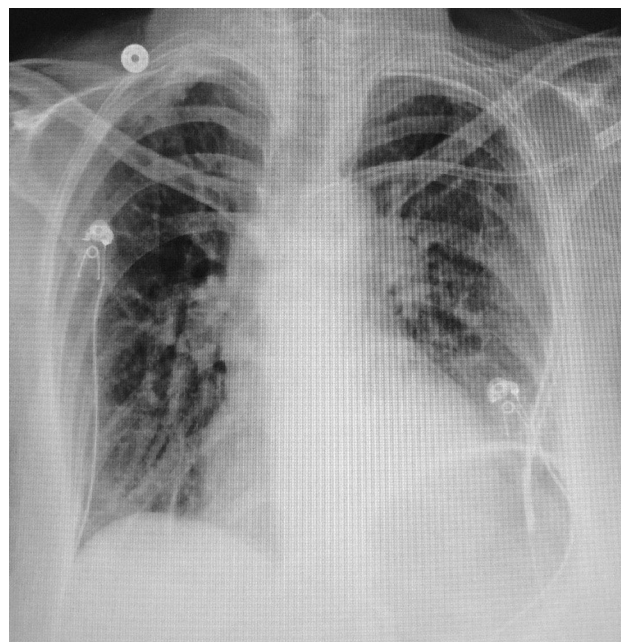


Figure 1. Postoperative chest x-ray anteroposterior (AP) view showing the absence of metal material.

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See page 1.e2 for disclosure information.

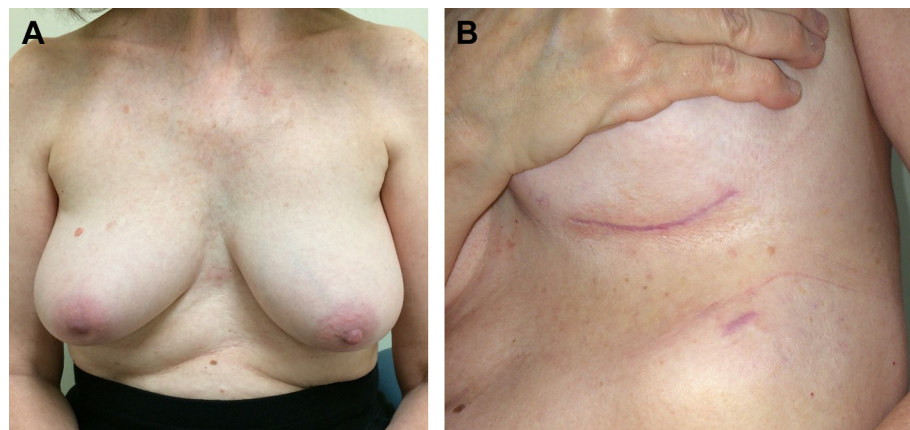


Figure 2. (A) Postoperative surgical site incision, anterior view. (B) Postoperative surgical site incision, anterolateral view with the breast retracted.

LAD via a small thoracotomy. Although conventional sternotomy LITA harvest makes use of surgical clips (or a harmonic scalpel) for control of its branches, this is even more critical during minimally invasive approaches, in which subsequent LITA branch control is more difficult.¹ Nevertheless, in this patient with metal sensitivity, LITA harvesting was performed without the use of metallic clips, with dissection and hemostasis achieved using careful, low-current conventional electrocautery alone. No metal was used for the chest closure, and a postoperative chest x-ray confirmed the absence of any metallic material (Fig. 1). The patient quickly recovered to normal functional status, with normal wound healing (Fig. 2) and no adverse event.

Discussion

Sensitivity to metallic compounds, mostly manifesting as allergic contact dermatitis, accounts for 10% of all dermatological disorders. Among the metals, nickel, chromium, and cobalt are well recognized sensitizers, and allergy to surgical metal clips has been reported. With the increasing use of titanium in the medical practice, there are now emerging reports of sensitivity to this metal as well.² In this report, we used MICS CABG, a newly developed but well validated minimally invasive CABG technique that allows for full coronary revascularization^{1,3} to graft this patient's LAD without recourse to metal clips or the use of a Harmonic scalpel (Ethicon US LLC).

Biomedical devices that have the most reported allergic reactions are dental, orthopaedic, and gynecological implants. There are also occasional reports on systemic or dermatological reactions to cardiovascular procedures, such as endovascular devices, pacemakers, and pectus repairs.^{2,4,5} The allergy is explained by the wear and corrosion of the metal, which leads to release of free ions, deposited in the tissues surrounding the implant.⁵ Apart from cutaneous and systemic allergic reactions, this might also manifest as progressive instability in the implant, and poor wound healing. In intravascular implants such as coronary stents, it is hypothesized that free metal ions react with serum proteins and act as superantigens, inducing neointimal hyperplasia.⁵

Evaluation for metal sensitivity includes the patient's history, the lymphocyte transformation test, and the patch test. The lymphocyte transformation test has limited availability, a high reliance on expert interpretation, and might be impractical for clinical use.⁵ The patch test is used to assess the reaction when metal components are placed against a patient's skin. For patients at high risk for allergy to a specific metal, it is recommended that patch testing be tailored to the component of the device that is being considered for implantation.

In patients in whom metal allergy is detected, treatment is controversial. A trial of steroids might be reasonable. If the presence of the implant poses more of a problem than a solution, removal is a viable recommendation. Literature shows that removal of the culprit device results in improved clinical status, such as resolution of the allergy symptoms and wound healing.^{2,4,5}

In our opinion, prevention remains the best cure, as illustrated in this case when MICS CABG was performed without use of metal clips or implants.

Disclosures

The authors have no conflict of interest to disclose.

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