

SHORT REPORT

Methicillin-resistant *Staphylococcus aureus* (MRSA) and Autogenous Saphenous Vein Grafts in Femoropopliteal Bypass Procedures

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Abstract: Do autogenous vein grafts provide resistance to graft infection in MRSA (Methicillin resistant *Staphylococcus aureus*) patients undergoing vascular surgery? This paper presents two MRSA patients, who underwent femoral popliteal bypass procedure with autogenous saphenous vein grafts. Despite prophylactic measures and all necessary care, both patients had graft infections and died as a result of MRSA septicaemia. Our conclusion is that autogenous vein grafts do not provide resistance to MRSA infection.

Introduction

In just 10 years, methicillin-resistant *Staphylococcus aureus* (MRSA) has resulted in major health control problems both in hospitals and in the community. MRSA is a heterogeneous group of organisms, which vary in virulence and epidemic potential. The importance of protection against this bacterium is of greater concern because the most common mode of spread is from the hands of nursing and medical personnel.¹

As vein grafts are one of the most popular methods by which vascular surgeons perform bypass, infection of these bypass grafts presents a serious complication to reconstructive vascular surgery. Some of the methods used by surgeons in an attempt to address this are graft preservation, excision and repeat grafting through clean tissue planes, as infection of prosthetic arterial grafts remains a serious problem.

Traditionally, autogenous (saphenous) vein grafts provided superior patency rates, with the consensus of opinion being that vein grafts offered increased resistance in patients with MRSA. Attempted graft preservation has been the choice of treatment on patients where infection is confined to a short segment of an autogenous vein graft. It is widely believed that

they are safe to use in MRSA patients, with reports of any complications being rare. However, Wijesinghe *et al.* recently reported cases of serious complications with vein grafts in patients infected with MRSA.¹ We present two cases where autogenous vein grafts used in MRSA patients had resulted in septicaemia and death, the second case highlighting a rare event. Both cases illustrate the need to reassess the use of vein grafts in such cases.

Case 1

A 73-year male was admitted with acute onset of rest pain and a cold left foot. On examination, femoral, popliteal, and dorsalis pedis pulses were all absent.

An occluded left superficial femoral artery was found on angiography. After failed angioplasty, a left femoro-popliteal bypass was successfully performed. A reversed left long saphenous vein graft was used for the occluded site. The patient made an uneventful postoperative recovery.

Two weeks later the patient was readmitted to Accident & Emergency with a pyrexia, sweating and rigors. His left leg was painful and on examination there was spreading cellulitis with discharging pus arising from the lower end of the groin incision. Broad-spectrum antibiotics were started and the wound debrided under local anaesthetic. MRSA was

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grown from the wound pus. Teicoplanin was started intravenously.

Three days later, a swelling was noticed in his left groin. Doppler ultrasound confirmed it to be a pseudo-aneurysm. The groin was exposed and it was discovered that the vein graft had given way at the anastomosis. The perforated vein graft was subsequently removed and another femoropopliteal bypass performed using the contralateral long saphenous vein.

Following surgery the patient continued with a swinging pyrexia, rigors and erythema at the groin site. He remained on intravenous antibiotics for 6 days, after which he died of septicaemia, renal failure and ARDS.

Case 2

An 87-year-old male, with known MRSA infection, was admitted with a worsening, painful left medial malleolar ulcer. He subsequently underwent a below knee popliteal bypass with a reversed long saphenous vein graft for an occluded superficial femoral artery. Vancomycin was administered as prophylaxis.

Three weeks later he was re-admitted with a left superficial groin haematoma. This was explored and drained. The anastomotic site was found to be intact. He was later discharged with no further events.

Five weeks later there was a second admission to Accident & Emergency with hypovolaemic shock and cardiac arrest. Secondary haemorrhage had resulted through a perforation in the middle part of the vein graft (see Fig. 1). The patient was resuscitated and the bleeding site controlled with pressure and elevation. Doppler ultrasound confirmed the presence of a pseudo-aneurysm.

During surgery, the graft and the adjacent artery were found to have disintegrated at the upper end. The haematoma was drained, the graft removed, the artery ligated and an above knee amputation was performed. The specimen vein graft grew *Pseudomonas*, and the wound itself grew MRSA. Intravenous Teicoplanin was used along the course of these events. Within the next 48 h, the distal end of the amputated stump started to discharge foul pus. This was managed with daily wound dressing, debridement and antibiotics. Some four weeks later the patient died of septicaemia.

Discussion

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a highly virulent pathogen. It has become a major



Fig. 1

nosocomial pathogen, accounting for its endemic nature in community hospitals, long term care facilities and tertiary care hospitals.²

With the frail and debilitated vascular group of MRSA patients, this is a major cause of morbidity and mortality.³ It has led to MRSA sepsis in 9% of all major vascular surgical cases and is a cause of death in 2% of patients.⁴ Graft infection is a catastrophic complication of surgery with mortality rates from 13–33%, and amputation rates of 19–53%.⁴ The incidence has probably been reduced by antibiotic prophylaxis, but the overall prevalence is increasing in parallel with the expansion in reconstructive vascular surgery and the emergence of MRSA.

Traditionally, the consensus of opinion favoured the use of vein grafts in MRSA patients, as it is thought that

vein grafts were resistant to MRSA infection.⁴ However, Ruddle *et al.* found that stripped venous grafts are frequently contaminated.⁵ The groin is a major source of contamination with approximately 50% of graft infections occurring here. MRSA is the most commonly found organism.⁶ In both our cases, reversed saphenous vein grafts were used as the bypass conduit. However it led to a course of drastic events; 3–4 weeks after surgery both patients developed groin wound haematoma, anastomotic leaks and eventually died. The second patient presented with graft perforation separate from the anastomoses which is a rare event and which was presumably caused by MRSA infection at one of the ligated tributary sites.

Evidence from vascular centres suggest that MRSA is a growing problem with an increasing number of centres reporting patients in whom MRSA was associated with vein graft failure, particularly secondary haemorrhage. Chalmers *et al.* showed that of the 15 patients with infrainguinal MRSA prosthetic graft infections, 10 required amputations with a further four dying from MRSA sepsis.⁷

The question arises as to how can we prevent and control this problem. There seems to be no one answer but the following are important points for consideration.

An attempt to eradicate MRSA infection prior to surgery should be considered. In those patients in whom elective surgery is undertaken. There should be reconsideration of the risk/benefit ratios of reconstructive surgery in lower limb occlusive disease and angioplasty should be considered, as an alternative.

Other graft options are now becoming increasingly available. Rifampicin soaked dacron, is an option as an alternative conduit. Vicaretti *et al.* showed that rifampicin reduced the rate of abscess formation, anastomotic disruption and graft thrombosis, when the inoculating organism was MRSA.⁹ Another conduit is arterial allograft, a material that has proven resistance to staphylococcal infection, but it has limited availability in the U.K.

It can be reasoned that once the surgeon becomes aware of the presence of MRSA, the primary treatment should be graft excision plus amputation – the aim being to preserve life rather than limb.⁸ The routine use of vancomycin as prophylaxis remains controversial and therefore selective use should be undertaken

with advice from microbiologists. The blanket treatment of all vascular patients with MRSA prophylaxis also needs to be reviewed as this could lead to the development of more resistant strains.

When colonisation/infection occurs in MRSA patients, we need more reliable data to ascertain the true incidence of the problem. Evidence suggests that strict isolation units, coupled with scrupulous hand washing and a multidisciplinary approach involving the nursing staff, medical staff and infection control team, may reduce MRSA transmission.

Conclusions

Our conclusion is that to avoid the above catastrophic consequences, we advocate that the autogenous venous graft should not be used for bypass surgery in MRSA patients, as they are not resistant to MRSA infection.

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