Clinical Infection in Practice 1 (2019) 100002

Contents lists available at ScienceDirect

Clinical Infection in Practice

journal homepage: https://www.journals.elsevier.com/clinpr

Case Reports and Series

Evolving antimicrobial resistance in a patient receiving palliative OPAT for a vascular graft infection: A case report

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ARTICLE INFO

Article history:
Received 25 February 2019
Accepted 14 July 2019

Keywords:
OPAT
Outpatient parenteral antimicrobial therapy
Palliative
Vascular graft infection

ABSTRACT

Prosthetic vascular graft infection is devastating and frequently fatal. Cure requires removal of the graft and reperfusion by placement of a new graft. However, no evidence based guidelines exist for management where removal of the graft is not possible. We describe a patient who lived in a state of chronic infection suppression through outpatient parenteral antimicrobial therapy (OPAT) over a period of 32 months, and outline the challenges experienced and strategies used to suppress infection in the face of escalating antimicrobial resistance. To date there have been very few reports of OPAT used in the palliative context and this case illustrates the microbiological issues that can arise and the importance of the full OPAT multi-disciplinary team in managing these issues and optimising the patient's quality and length of life.

Introduction

Prosthetic vascular graft infection is a devastating complication, with a mortality rate of up to 75%.[1] Cure requires removal of the graft and reperfusion by placement of a new graft.[2] However, no evidence based guidelines exist for management where removal of the graft is not possible. We describe a patient who lived in a state of chronic infection suppression through outpatient parenteral antimicrobial therapy (OPAT) over a period of 32 months, and outline the challenges experienced and strategies used to suppress infection in the face of escalating antimicrobial resistance. To date there have been very few reports of OPAT used in the palliative context and this case illustrates the microbiological issues that can arise and the importance of the full OPAT multi-disciplinary team in managing these issues and optimising the patient's quality and length of life.

Case report

A 69-year-old woman presented acutely with an aorto-enteric fistula. She underwent endovascular aneurysm repair and cross-over graft. Post-operatively she developed methicillin-resistant *Staphylococcus aureus* (MRSA) graft infection. Further operative intervention was considered impossible due to her complex vascular history and frailty.

Following several months of inpatient intravenous antibiotics she was referred for OPAT as it was hoped that OPAT would offer a palliative option whilst maintaining the patient's quality of life. Her antimicrobial history, current medications, microbiology and drug allergy status were reviewed and there were no oral antimicrobial options for her MRSA infection. She commenced OPAT administered by her partner at home with weekly medical and nursing reviews, line dressing changes and blood tests. The wound over her cross-over graft broke down exposing the graft: dressings were managed by the community nurse team and the patient herself.

Fig. 1 illustrates the patient's C-reactive protein (CRP), microbiology and antimicrobial regimes during her 32 months of OPAT. There were four occasions on which she reported rigors and malaise to the OPAT team: on all of these she was apyrexial and clinically well when subsequently reviewed but had an increased CRP and positive blood cultures. CRP measurements between these episodes remained between 40 and 60 mg/L in keeping with chronic low level sepsis. She also had chronic anaemia, hypoalbuminaemia and failure to gain weight.

There were 4 phases in her OPAT management:

1. Daptomycin (6 mg/kg daily) with oral co-amoxiclav (625 mg three times daily).
   The patient was initially commenced on daptomycin as an inpatient. Prior to discharge from hospital she developed cellulitis associated with her exposed cross-over graft. Oral co-amoxiclav was added as it was felt that her cellulitis was most likely to be caused by Gram negative organisms given the proximity of the graft to

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https://doi.org/10.1016/j.clinpr.2019.100002

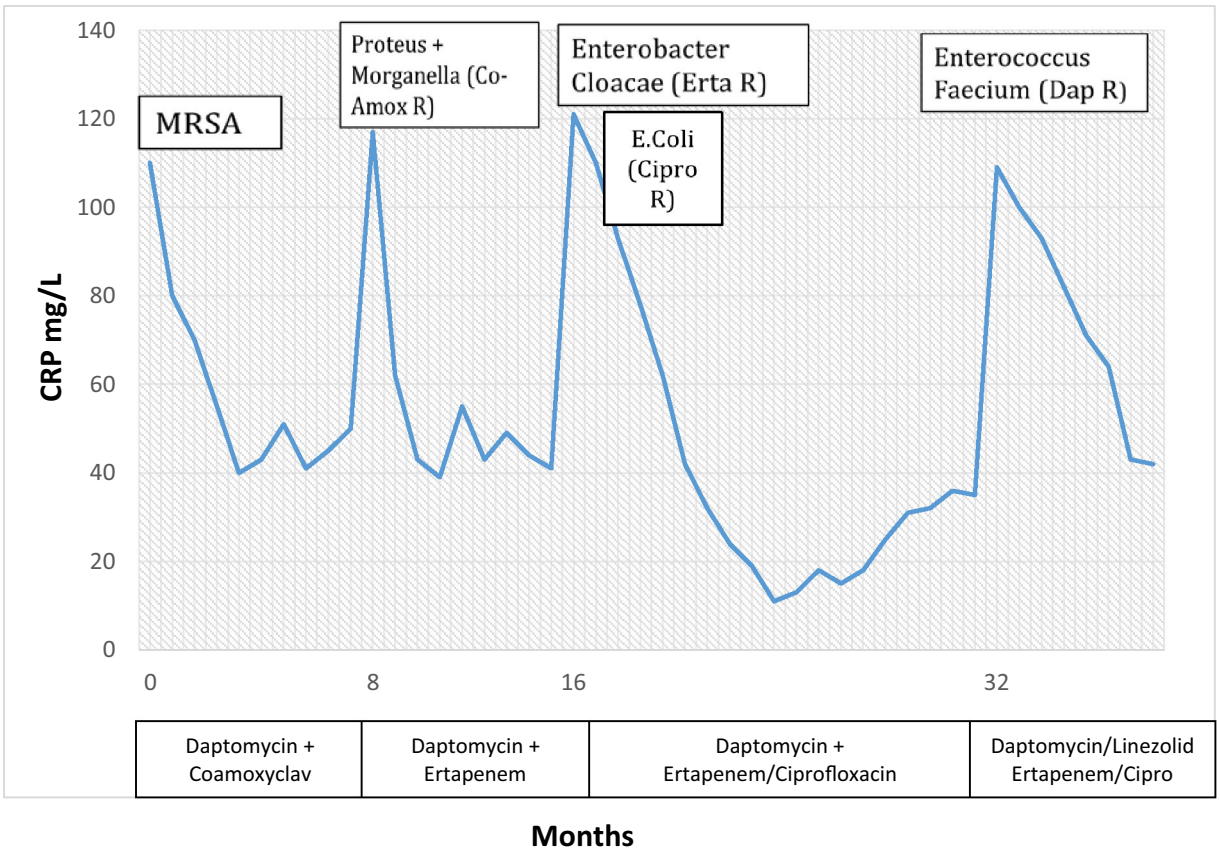

Fig. 1. CRP, blood culture isolates and antimicrobial regimes during OPAT.

bowel. Her cellulitis resolved and she was discharged to OPAT and remained clinically stable with improvement in her CRP.

2. Daptomycin with ertapenem (1 g daily).

   After around eight months she reported rigors, sweats and malaise. Blood culture grew co-amoxiclav-resistant *Proteus mirabilis* and *Morganella* sp. She was admitted briefly and after discussion by the OPAT team was switched from oral co-amoxiclav to intravenous ertapenem, together with ongoing daptomycin. Again her CRP improved and she was discharged back to OPAT.

3. Daptomycin with ciprofloxacin (750 mg bd orally) or ertapenem (4–6 weekly rotation).

   After a further eight months the patient again reported two rigors. Blood cultures grew ertapenem-resistant *Enterobacter cloacae* and ertapenem was switched to oral ciprofloxacin. However the CRP was slow to settle and further blood cultures grew ciprofloxacin-resistant *Escherichia coli*. The decision was taken by the OPAT team to rotate ertapenem and oral ciprofloxacin at 4–6 week intervals. Her CRP again improved and she remained well. The introduction of periods of oral therapy allowed her and her partner to go on holiday within the UK through simplifying her daily intravenous regime.

4. Linezolid (600 mg twice daily) with alternating ertapenem and ciprofloxacin.

   Sixteen months later she once again presented with symptoms of infection and blood cultures grew daptomycin-resistant *Enterococcus faecium*. Daptomycin was switched to oral linezolid: this agent had not been used previously because of concomitant long term anti-depressant therapy. The OPAT team had previously recognised the potential need to use linezolid and had arranged psychiatric assessment. It was deemed acceptable to withdraw her antidepressant therapy at this point, allowing use of linezolid. She received this for two weeks before being switched back to daptomycin. She also continued her Gram-negative antimicrobial regime.

Unfortunately the patient was admitted under the vascular team six weeks later with acute onset ischaemic limb pain. She underwent an emergency graft explantation, then bilateral above knee amputations but continued to experience limb ischaemia. No further surgery was possible and she was discharged home with palliative care and died one week later.

Discussion

The incidence of prosthetic graft infections is 1–6%[3] with MRSA the most common causative organism.[4] There are no guidelines for patients who cannot undergo surgery. One study reported that patients treated only with long term suppressive antimicrobial therapy survived a median of 41 months.[5] As seen in this case long term antibiotics can result in increasing antibiotic resistance and complex management issues.

This patient's management demonstrated the importance of a robust OPAT service structure with regular monitoring, clear lines of communication with the patient and protocols for escalation. Furthermore the OPAT multi-disciplinary team was essential in reviewing the microbiological data and providing expert consensus to optimise the management of these difficult infections.[6,7] The patient's partner was an integral member of the team and took pride in administering her treatment without complications.[8]

OPAT was invaluable to this patient and her family. Without OPAT she would have remained in hospital for the last three and a half years of her life. Although her management could be regarded as an OPAT 'success', previous UK and USA OPAT guidelines would have classed her outcome as a failure of OPAT.[6,9] The recent OPAT UK updated Good

Practice Recommendations recognise the increasing use of OPAT as a palliative measure in patients with incurable prosthetic material infections and propose outcomes based on treatment aim (in this case palliation) and whether the intended treatment aim was achieved.[10]

Funding declaration

This work had no dedicated funding.

Declaration of Competing Interest

None to declare.

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