Early pyrexia after endovascular aneurysm repair: are cultures needed?

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ABSTRACT

INTRODUCTION The post-implantation syndrome after endovascular aneurysm repair (EVAR) is increasingly recognised. However, when non-vascular trainees are responsible for the care of these patients out of hours, many are investigated if pyrexial. This study assesses the role of microbiological investigations in pyrexia after endovascular aneurysm repair.

PATIENTS AND METHODS The notes of 75 EVAR patients were reviewed retrospectively. The incidence of postoperative pyrexia and infective complications were calculated and the result of any cultures obtained.

RESULTS Overall, 58 (77.3%) patients were pyrexial with 48 h of stent insertion. Twenty-four had blood cultures and 12 had urine cultures taken within 48 h of surgery. All of these cultures were negative. However, of those with a pyrexia after 48 h, one of nine blood cultures and two of 11 urine cultures grew organisms. Five pyrexial patients and one apyrexial patient developed a wound infection (a non-significant difference, $P = 1.00$).

CONCLUSIONS Pyrexia within 48 h of EVAR is common. Microbiological investigation in the first 48 h in these patients is unrewarding. After 48 h, cultures are more likely to show growth. Although each patient must be assessed clinically for signs of sepsis, blood and urine cultures within 48 h of EVAR are generally unnecessary.

KEYWORDS

Endovascular aneurysm repair (EVAR) – Pyrexia – Culture – Infection

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A ‘postimplantation syndrome’ of pyrexia and elevated white cell count is well recognised after endovascular aneurysm repair (EVAR).¹ Although this has been shown not to be associated with stent graft or systemic infection,² many patients who develop a pyrexia shortly after endovascular aneurysm repair are investigated, often overnight. Presumably this is due in part to lack of awareness of the ‘postimplantation syndrome’ amongst juniors and non-vascular trainees. Given that many pyrexial patients were investigated in our unit, we took the opportunity of assessing whether microbiological cultures are worth taking in the pyrexial but well post EVAR patient.

Patients and Methods

The postoperative temperature charts of 75 consecutive elective infrarenal endovascular aneurysm repairs (all with Cook Zenith TriFab devices) were reviewed retrospectively in a single vascular unit. All cases received iv cefuroxime at induction of anaesthesia. Pyrexia was defined as a documented temperature of 37.5°C at one or more observations, as this was the temperature at which the on-call doctor was alerted and, therefore, may have

taken cultures. The electronic results system was interrogated for the results of any microbiology specimens sent in the postoperative period. All infective outcomes were recorded. The incidences of wound infection (clinically diagnosed as a cellulitic wound) in the pyrexial and apyrexial groups were compared using Fisher’s exact test.

Results

Overall, 58 (77.3%) of patients were pyrexial postoperatively. Blood cultures (paired aerobic and anaerobic) were sent for 24 patients (8 on the postoperative night) and urine cultures (midstream or catheter samples) for 12 patients who were pyrexial in the first 48 h. None of these samples grew any organisms, although one blood culture bottle was contaminated with *Acinetobacter* spp. and one with *Staphylococcus aureus*.

Of those who were pyrexial after 48 h, one of nine blood cultures sent grew organisms (*Escherichia coli*: 1 bottle only) as did two of 11 urine cultures (1 *Pseudomonas* spp. and 1 *E. coli*; Fig. 1). The source of the *E. coli* bacteraemia was unknown: the patient remained well and had no evidence of an infective source.

Figure 1 Blood (BC) and urine (MSU) culture results from those who were pyrexial within the first 48 h post EVAR compared with those who were pyrexial after 48 h.

A wound infection was clinically diagnosed in five of those with pyrexia (8.6%) and one of those without a documented pyrexia (5.9%). There was no significant difference between the wound infection rate in those with and without pyrexia (two-tailed P -value = 1.000). One pyrexial patient developed a chest infection and one bowel ischaemia. Both of these patients had a prolonged pyrexia (> 48 h). Thus pyrexia indicated an infective or ischaemic concern in 10 of 58 (17.2%) of cases (5 wound infections, 2 urinary infections, 1 chest infection, 1 bowel ischaemia and 1 bacteraemia); the pyrexia was prolonged or occurred after 48 h in most of these cases.

Discussion

Pyrexia following EVAR is well-reported with incidences ranging from 25% (in this paper a temperature over 38°C was considered to be a pyrexia and all patients were given anti-inflammatory drugs⁵) to 94%.^{2,4} Postoperative pyrexia has been shown to be more common (72%) in endovascular repair than in open repair (38%).⁵

Inflammatory markers were not measured in this study as they have been well shown to be elevated after endovascular aneurysm repair. The white cell count (WCC) peaks at 24–72 h, the C-reactive protein (CRP) at 48–72 h and interleukin-6 (IL-6), interleukin-8 (IL-8) and interleukin-1 β (IL-1 β) also rise.^{5,5,6}

The combination of fever, elevated white cell count and CRP with or without a coagulation disturbance is known as the post implantation syndrome.¹ Post-implantation syndrome is clearly associated with endovascular repair.^{1,2} Many causes have been cited including neutrophil activation by the contrast medium,⁷ catheter manipulation

through the aneurysm (causing endothelial activation or disturbance of the mural thrombus)⁸ and splanchnic ischaemia during stent graft insertion leading to bacterial translocation and release of endotoxin and cytokines (IL-6, TNF).⁹ Sac thrombosis occurs after successful exclusion of the aneurysm from the circulation and, given that venous thrombosis is well known to cause pyrexia,¹⁰ it is likely that sac thrombosis will also contribute to post-EVAR pyrexia.

Most post-stent pyrexias will be due to the post-inflammatory syndrome rather than an infective (or ischaemic) complication. This is borne out by our study which shows that cultures (blood and urine) taken in the clinically well patient after EVAR are unlikely to be positive, particularly in the first 48 h. Culture results have rarely been reported in clinical studies. However, in one smaller study of 23 cases, blood cultures taken routinely at 24 h and 48 h post-EVAR were all negative, irrespective of whether the patient was pyrexial.⁹

Despite this, a postoperative pyrexia should not be immediately dismissed as insignificant. There is always the inevitable concern of a wound or chest infection and both these should be considered in the pyrexial patient. Stent graft infection, although greatly feared, is rare with a reported incidence of 1.2%.¹¹ Furthermore, post-implantation syndrome has been shown not to be associated with graft infection.¹²

A prolonged pyrexia may also be a sign of bowel ischaemia. However, a pyrexia in isolation is not a good indicator of clinically significant bowel ischaemia and, as in the case here, it is unlikely to be diagnosed in the absence of other symptoms.

Our results suggest that there is a role for the use of 'routine' urine cultures in pyrexia after 48 h. This led to the diagnosis of an otherwise clinically silent urinary tract infection in two cases and, therefore, led to prompt and microbiologically appropriate treatment. However, as the single positive blood culture was in a well patient, without a clinical infective source, it is difficult to conclude that the positive culture led to early treatment of an infection, although one could speculate that the antibiotics given for the positive blood culture may have prevented the clinical signs of a wound, chest or urine infection developing.

Conclusions

Postoperative pyrexia is common following EVAR and is usually of little clinical importance, being an indicator of the post-implantation syndrome. Taking blood and urine cultures in the first 48 h in the clinically well patient is unlikely to be useful. After 48 h such cultures are significantly more likely to be positive, and urine cultures in particular may lead to earlier antibiotic treatment of urinary infection.

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