

## CASE REPORT

# Pseudomonas aeruginosa endocarditis of a bioprosthetic aortic valve associated with sigmoid adenocarcinoma in a Non-IVDU Patient

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### ABSTRACT

Endocarditis with atypical organisms poses a diagnostic and therapeutic challenge to physicians despite medical and surgical advances. *Pseudomonas aeruginosa* endocarditis is rare, especially in the absence of intravenous drug use (IVDU). Here, we present a case of non-IVDU, prosthetic aortic valve *P. aeruginosa* endocarditis associated with sigmoid carcinoma.

A seventy five year old gentleman with a bioprosthetic aortic valve presented with pyrexia on and off for six months and a 6 month history of weight loss. Three sets of blood cultures grew *pseudomonas aureginosa*. A CT scan was done to find the source of the infection and showed a partially obstructive lesion of the sigmoid colon which was later biopsied and found to be moderately differentiated adenocarcinoma. A Trans-oesophageal echocardiogram (TOE) showed a large 2.7cm mobile mass attached to all three leaflets of the aortic valve. He was started on Augmentin initially and then changed to tazocin and ciprofloxacin. Gentamicin was added in later and the tazocin changed to meropenem.

He continued to spike. One month post admission he had a redo aortic valve replacement to a tertiary care center. Despite his redo surgery he continued to spike and continued to grow *pseudomonas aureginosa* from his blood cultures. He passed away three months post-admission after deteriorating further.

**Key words:** *p. aeruginosa*, endocarditis, prosthetic valve.

### CASE REPORT

Injuries Mr CC, a 75-year-old gentleman was found by his carers, unresponsive. In the emergency department he was vomiting, generally unwell and hyperglycaemic (Glucose 32.2 mmol/L), with a heart rate of 150/m, temperature of 37.3 C, respiratory rate of 20/m and oxygen saturation of 98% on air on pulse oximetry. His Glasgow Coma Scale was found to be 15/15 on admission.

He had a history of change in bowel habit with a 6-month history of diarrhoea with weight loss. He had been investigated for this with stool cultures and HIV testing which was negative. He was an insulin-dependent diabetic. He had previously had a bioprosthetic aortic valve replacement carried out 3 years prior and an open reduction of fracture for a Lisfrans fracture of the right foot four months previously. No other invasive procedures had been carried out.

He had never smoked, did not drink alcohol or take recreational drugs. No significant travel history was noted.

On examination he had no peripheral stigmata of endocarditis, but poor dentition, normal heart sounds, no murmurs and his chest was clear. His inflammatory

markers were raised. His CRP was 100 mg/L, white cell count=18.7 ×10<sup>9</sup>/L, Neutrophil=16.6 ×10<sup>9</sup>/L. He was found to have atrial flutter at 150 beats/min, ketonuria, and was acidotic. Mr CC was treated with Digoxin, was given intravenous insulin and was treated for sepsis of unknown origin with intravenous (IV) Augmentin.

Mr CC started to spike temperatures six days after admission. On advice of the microbiologist at this point Augmentin was stopped and IV Tazocin and IV ciprofloxacin started. His first blood culture grew *P. aeruginosa*. Multiple urine cultures and stool cultures were negative. Ten days post admission a second set of blood culture grew *P. aeruginosa* sensitive to ciprofloxacin and Tazocin. Under microbiology advice, gentamicin was started, Tazocin continued. Fifteen days post-admission a third set of blood cultures grew *P. aeruginosa*. Gentamicin was continued and Meropenem started as per sensitivities. The fourth and fifth set of blood cultures showed no growth. He continued to have persistent pyrexia despite antibiotics throughout his three week stay in hospital.

He became confused developing slurred speech seventeen days after admission. A head CT done at this point showed a right hemispheric infarct.

Chest/ Abdomen/ Pelvis CT were done twenty days post-admission showed thickening of the sigmoid colon with a partially obstructing lesion. Biopsies during the flexible sigmoidoscopy from a tumour at

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20 cm, confirmed moderately differentiated adenocarcinoma.

A trans-thoracic echocardiogram twenty one days after admission showed mild concentric left ventricular hypertrophy, good biventricular systolic function, no significant regurgitation, and his biological aortic valve replacement appeared well seated.

He was transferred to a tertiary centre, three weeks after admission, where a 2D and 3D TOE showed that his bioprosthetic aortic prosthesis had severely thickened leaflets, with a large 2.7cm mobile mass attached to all three leaflets of the aortic valve, prolapsing from the left ventricular outflow tract into the aorta. There was no evidence of aortic regurgitation or abscess.

A redo aortic valve replacement (AVR) was carried out because of non-response to antibiotics, one week after admission to the tertiary care center without immediate complications. One blood culture immediately post-op grew *Pseudomonas*, however, further bottles did not show any growth. Biopsy of the valve confirmed *P. aeruginosa*. Post-operative he was treated with Colistin and ciprofloxacin and had progressive recovery, with resolution of sepsis.

He was transferred back to Darent Valley Hospital for intensive rehabilitation awaiting a colectomy one month after being transferred to the tertiary care center.

Four weeks post-redo AVR he started spiking. He developed *Pseudomonas* septicaemia confirmed on four separate blood cultures which were done at intervals of two days each. He deteriorated despite being started on IV Tobramycin, ciprofloxacin, metronidazole, rifampicin and Colistin which were continued for three weeks. A CT confirmed he had a localised perforation secondary to sigmoid cancer. He passed away three months after presentation.



**Figure 1**, TOE image showing aortic valve vegetation

## DISCUSSION

*P. aeruginosa* is an opportunistic gram-negative aerobic rod, which can affect both native and prosthetic, left and right-sided heart valves. Of relevance to our case, *P. aeruginosa* shows a preference for prosthetic valves.<sup>1</sup>

*Pseudomonas* endocarditis was first noted in 1899, as described by Reyes *et al.*<sup>2</sup> Most cases (95%) are associated with IV drug use and tend to be right-sided lesions.<sup>3</sup> Left-sided *P. aeruginosa* is rare with few literature evidence.<sup>4</sup> Furthermore, in a prospective study of 702 IE cases, only 4 were *Pseudomonas* endocarditis.<sup>4</sup>

Bioprosthetic valves are more commonly associated with endocarditis than mechanical valves.<sup>5</sup> Of interest, all four of (4) cases of PVE had a history of instrumentation. In our patient, it is consistent with previous findings that he developed endocarditis post-procedure.<sup>6</sup>

*Pseudomonas* endocarditis is commonly reported as a nosocomial infection, secondary to catheters, dialysis or RTI in non-IVDU patients.<sup>4,7</sup> However, in our case, the association was with sigmoid carcinoma. Endocarditis was first documented as a complication of colonic malignancy in 1951.<sup>8</sup> This has sparked a growing interest between the association of *Streptococcus gallolyticus* and colon carcinoma.<sup>9</sup> However the commonest association is between bowel cancer and *S Bovis* endocarditis. To the authors knowledge, this is the first reported case of *Pseudomonas* endocarditis associated with colon cancer. Diabetes is an independent predictor for the development of endocarditis, irrespective of valvular abnormalities.<sup>10</sup> Diabetic endocarditis patients have a significantly higher mortality rate.<sup>10,11</sup> Diabetes and malignancy are independently predictive of mortality in IE.<sup>12</sup> Both the prosthetic valve and diabetes are likely to have contributed to the acquisition of endocarditis and poor prognosis in our patient. Early diagnosis of *Pseudomonas* endocarditis is critical, hence continuing *Pseudomonas* bacteraemia despite antibiotics should prompt investigations for endocarditis. Trans-thoracic echocardiograms (TTE) have a sensitivity of less than 70% in the diagnosis of endocarditis.<sup>13</sup> In this case, his TTE was essentially unremarkable, and the fact that the TOE did not show any evidence of aortic regurgitation despite the large vegetation shows the importance of thorough investigations. The recommended treatment for *Pseudomonas* endocarditis is a high dose aminoglycoside and an extended spectrum penicillin for more than six weeks.<sup>3,4,14</sup> Surgical intervention is recommended in those if bacteraemia persists for more than two weeks despite adequate courses of antibiotics.<sup>2</sup> Valve replacement is recommended for curative treatment of left-sided endocarditis.<sup>14</sup> Furthermore, early surgery is inversely associated with mortality.<sup>12</sup>

The prognosis for *Pseudomonas* endocarditis is poor, with as high as 80% mortality rate.<sup>15</sup> This is hypothesised to be partly due to resistance to beta-lactams and aminoglycosides. The growth of *P. aeruginosa* from blood cultures normally takes between 48 and 98 hours of incubation.<sup>16</sup> Hence, the diagnosis of the causative organism for septicaemia is often delayed. Fluroquinolones may be potentially promising

in the event of resistance.<sup>15</sup>

Left-sided endocarditis also carries a poor prognosis due to the potential for rapid and serious complications, including congestive cardiac failure, ring and annular abscess, and embolic events.<sup>4,15</sup> The availability of oxygen in left sided lesions is hypothesised to be one reason that left sided lesions respond more poorly than right lesion to treatment in Pseudomonas infective endocarditis.<sup>4</sup> found that despite adequate medical or medical and surgical therapy, three of four non-IVDU Pseudomonas endocarditis patients passed away, all suffering from persistent or recurrent bacteraemia. The authors noted that persistent P. aeruginosa bacteraemia in patients with a history of instrumentation should rouse the suspicion of endocarditis. Indeed, a low clinical index of suspicion is required for investigation of endocarditis in patients with prosthetic valves, who present with repeated positive blood cultures.

## CONCLUSION

Infective endocarditis due to atypical organisms such as P. aeruginosa poses a diagnostic challenge and a significant risk to the patient. Persistent bacteremia in a patient with a prosthetic valve, warrants further investigations. Of note, in this patient the presence of moderately differentiated adenocarcinoma, which was newly diagnosed during his hospital stay, suggested that this bowel cancer could be a possible source of the endocarditis. Further observational studies would need to be carried out for clarification of the latter.

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