

Role of PET/CT scan in identifying late-onset graft infection following Bentall procedure

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DESCRIPTION

A 34-year-old man presented with fatigue for 3 months and fever for the last 1 month. His previous medical history was significant for Marfan syndrome and he had undergone Bentall procedure 10 years ago for type A aortic dissection. Postsurgery, he was lost to follow-up for the next 10 years until the current presentation. On examination, the pulse was good volume with a rate of 100/min, blood pressure was 110/70 mm Hg and the oral temperature was 102.3⁰ F. General physical examination revealed a tall (193 cm), thin built individual with positive wrist and thumb sign and pectus carinatum deformity (figure 1A–C). Cardiac examination revealed a grade 4/6 pan-systolic murmur over the apex, radiating to the axilla.

Chest X-ray revealed cardiomegaly and ECG showed left ventricular hypertrophy (figure 1D). His laboratory parameters showed elevated leucocyte count (14 000/mm³), raised C reactive protein (CRP) (34 mg/L) and procalcitonin (2.1 ng/mL). Transthoracic echocardiography (TTE) revealed dilated left atrium and left ventricle with a normally functioning prosthetic aortic valve. Additionally, there was anterior mitral leaflet prolapse with severe eccentric mitral regurgitation (figure 1E and F). As per the guidelines, transoesophageal echocardiography (TEE) is recommended for patients of suspected prosthetic valve endocarditis or in those with a high suspicion and an indeterminate TTE.¹ Accordingly, TEE was performed to evaluate for mitral valve or prosthetic aortic valve endocarditis, but it was negative (figure 1G–I). Contrast-enhanced CT (CECT) chest and abdomen to look for other causes of fever was unremarkable (figure 2A and B).

However, when a pair of blood cultures grew methicillin-resistant *Staphylococcus epidermidis*, suspicion of graft/prosthetic valve infection was raised. Subsequently, positron emission tomography (PET)/CT revealed hypodense collection in the periaortic graft (maximum standardised uptake value—9.8) suggestive of active infection (figure 2C and D). This confirmed the diagnoses of infective endocarditis.¹ He was started on intravenous vancomycin and gentamycin and oral rifampicin. Surgical intervention was offered, however, he refused. The fever responded by day 6. Antibiotics were given for a duration of 12 weeks. The laboratory parameters including leucocyte count, CRP and procalcitonin normalised. Currently, the patient is doing fine at 6 months of follow-up, while on ramipril, 2.5 mg and metoprolol 50 mg/day. He has been recently referred for mitral valve repair in view of severe mitral regurgitation.

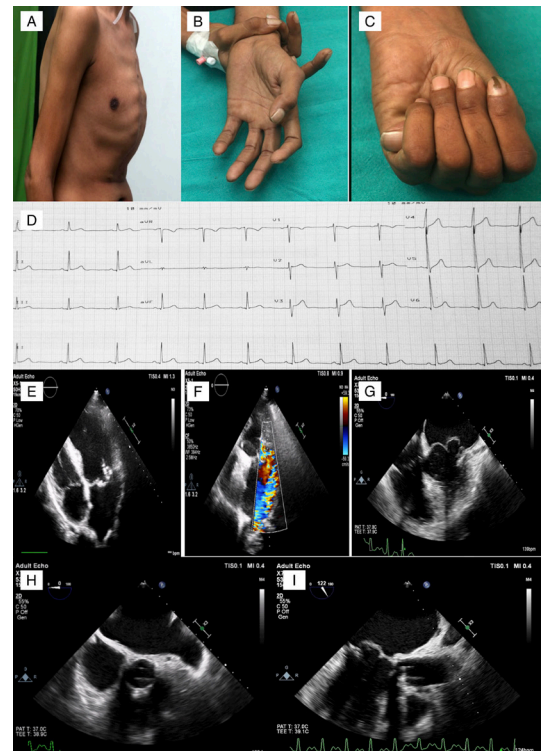


Figure 1 Clinical imaging showing pectus carinatum (A), positive wrist sign (B) and positive thumb sign (C). ECG revealed left ventricular hypertrophy (D). Transthoracic echocardiography images showing anterior mitral leaflet prolapse (E) with severe eccentric mitral regurgitation (F). Transoesophageal echocardiography images showing mitral valve prolapse without any vegetation on the leaflet (G). Prosthetic aortic valve in short axis (H) and long axis (I) showing no evidence of periprosthetic infection/collecton.

Infections are uncommon after the Bentall procedure, with an incidence of 1.4%.² The diagnoses in these cases remain challenging and a variety of tests may be needed for confirmation. In general, CT and TEE have good accuracy for prosthetic valve and graft infections,³ but post-Bentall graft infection can be missed,⁴ like in the index case. PET/CT has shown to increase the sensitivity of the modified Duke criteria when combined with clinical, microbial and echocardiographic parameters. In the largest series on Bentall graft infection by Machelart *et al*, the sensitivity of CECT was 37.5% compared with PET/CT, which had a 100% sensitivity.⁴ The majority of infections are late onset and are caused by Gram-positive cocci.⁴ Surgery remains the preferred treatment option, however may not always be feasible given the complexity and high-risk nature of the procedure.⁵ Medical therapy with



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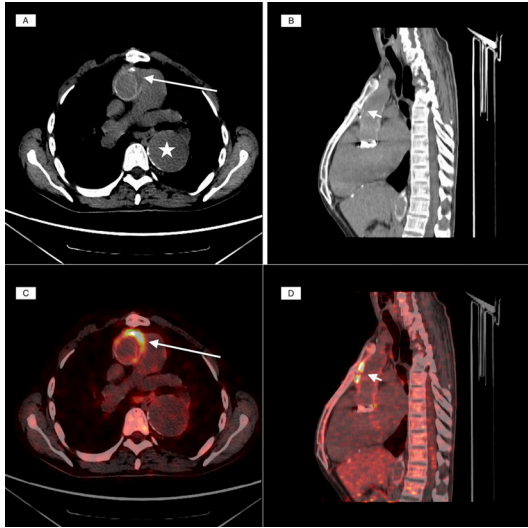


Figure 2 Axial (A) and sagittal cuts (B) of CT of the chest failed to identify any periaortic infection. Prosthetic aortic valve and graft extending till descending thoracic aorta can be seen (white star). Corresponding positron emission tomography cuts showing periaortic, vascular graft infection in axial (C) (long white arrows) and sagittal cuts (D) (short white arrows).

prolonged antibiotics (>3 months) is effective in those who are not surgical candidates. PET/CT correlates poorly with clinical response and, hence, it is not recommended at follow-up.⁴

Patient's perspective

After the valve surgery, I was doing fine for the last 10 years. I had not had such a persistent and high fever all my life, and I was afraid. The doctors did lots of tests and were finally able to diagnose and treat me. I thank God and the entire treating team for getting me through this illness.

Learning points

- ▶ Graft infection post-Bentall is a rare but serious complication.
- ▶ Most infections are late onset and caused by Gram-positive cocci.
- ▶ A high index of suspicion is needed and positron emission tomography/CT may provide the only clue.
- ▶ Surgery may not be feasible in many cases, and long-term treatment with appropriate antibiotics is a suitable alternative.

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