

An unusual cause of right heart failure

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Abstract

Carcinoid syndrome is a paraneoplastic condition, which usually affects the lungs or gastrointestinal tract but uncommonly cardiac valves can be involved, causing carcinoid heart disease. We describe a case of a 60-year-old man presented with a twelve-month history of worsening shortness of breath and decreased exercise tolerance. Investigations confirmed grade 1 metastatic neuroendocrine carcinoma (carcinoid tumour) of likely gastrointestinal tract origin. Two months after diagnosis he underwent successful tricuspid valve replacement and pulmonary root replacement. Cytoreductive surgery of the right lobe of the liver and the ileal primary is planned. Cardiac surgery is the only definitive treatment for carcinoid heart disease and should be considered in all those with symptoms and evidence of severe valvular disease.

Brief Report

A 60-year-old man presented with a twelve-month history of worsening shortness of breath and decreased exercise tolerance. For six months, there had been associated leg swelling, hot flushes and loose stools (up to 12 times per day). His past medical history included hypertension and dyslipidaemia. His medications were amiloride, spironolactone, nifedipine, enalapril and atorvastatin. He worked in a water treatment plant, was a non-smoker and drank 16-20 units of alcohol per week. Initial blood results were unremarkable (Table 1).

A transthoracic echocardiogram (TTE) demonstrated severe right ventricular (RV) dilatation (basal diameter 68 mm, RV length 81 mm) with normal systolic function (Figure 1A). The left ventricular cavity was small with normal systolic function (LV ejection fraction 55-60%). There was flattening of the septum during diastole

consistent with RV pressure overload (Figure 1B). The right atrium was severely dilated (area 41 cm²). The tricuspid valve leaflets were thickened and restricted with loss of coaptation (Figure 1C). As a result, there was severe tricuspid regurgitation with a triangular pattern of the Doppler profile (Figure 1D) and flow reversal in the hepatic vein. The pulmonary valve leaflets were thickened (Figure 2) with increased gradient across the valve (mean gradient 8.5 mmHg). Following admission, he was treated with intravenous diuretics.

Magnetic resonance imaging detected a 13.5 cm liver lesion (Figure 3), caecal thickening and extensive ascites. Positron emission tomography-computed tomography (PET-CT) using a Gallium-68 labelled somatostatin analogue localized multiple liver lesions with intense tracer uptake, compatible with neuroendocrine metastases (Figure 4). There was intense increased tracer uptake in a focal segment of the ileum, suspicious for a primary neuroendocrine small bowel tumor (Figure 4).

Liver biopsy confirmed grade 1 metastatic neuroendocrine carcinoma (carcinoid tumour) of likely gastrointestinal tract origin. He was started on octreotide which was changed to sandostatin and cyproheptadine. His bowel symptoms and flushing started to improve. Two months after diagnosis he underwent successful tricuspid valve replacement and pul-

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monary root replacement. Cytoreductive surgery of the right lobe of the liver and the ileal primary is planned.

Table 1. Primary blood results.

Test	Result	Normal range
Haemoglobin	153	(130-170) g/L
White blood count	8.0	(4.0-11.0) x 10 ⁹
Platelets	195	(150-400) x 10 ⁹
C reactive protein	7	(0-4) mg/L
Estimated glomerular filtration rate	39	(70-130) mL/min
Bilirubin	21	(0-21) umol/L
Alt	27	(4-59) IU/L
ALP	194	(35-129) IU/L
Albumin	42	(40-52) g/L
Corrected calcium	2.43	(2.15-2.55) mmol/L
Immunoglobulin A	5.91 (slightly raised)	(0.8-4.0) g/L
Serum protein electrophoresis	No paraprotein band	-
CEA, CA19-9, auto-immune screen	Normal	-
Hepatitis serology	Normal	(0-35) kU/L
Urine 5-HIAA	1182 umol/L	<50 umol/L
Urine 5-HIAA	713 umol/L	<50 umol/L

Discussion and Conclusions

Carcinoid syndrome is a paraneoplastic condition, which usually affects the lungs or gastrointestinal tract but uncommonly cardiac valves can be involved, causing carcinoid heart disease. Carcinoid syndrome is rare, with an approximate incidence of 1.2-2.1 per 100,000 of the general population.¹ Patients present with shortness of breath, diarrhoea, wheeze and facial flushing. These classic symptoms are attributed to the release of polypeptides, biogenic amines and prostaglandins secreted by carcinoid tumours. These include serotonin (5-HT), dopamine, histamine, bradykinin, chromogranin A.²

At a molecular level, neuroendocrine tumour (NET) growth is poorly understood. Genetic syndromes including Von Hippel Lindau syndrome and neurofibromatosis may be associated with gastrointestinal NETs.^{2,3}

Diagnosis of carcinoid syndrome is based on clinical symptoms, 24 h urinary 5-HIAA collection, serum chromogranins (including A, B and C) and imaging using MRI or PET-CT scanning with radio-labelled somatostatin analogues. PET-CT scanning using these methods has been shown to improve detection and staging of neuro-endocrine tumours.⁴

Carcinoid heart disease usually manifests as thickening of the endocardium of the right heart, the left heart is spared due to inactivation of 5-HT by the lungs.⁵ The thickening is due to plaque-like fibrous deposits, which can adhere to any area of endocardium including the valvular cusps, papillary muscles and cardiac chambers.

TTE should be the first line investigation in those suspected of having carcinoid heart disease. This may show thickening of either the tricuspid or pulmonary valve with consequent stenosis or regurgitation. Long standing disease results in progressively raised right heart diastolic pressures and failure. TTE should also be considered in those undergoing surgery for resection of carcinoid disease in lung, liver or bowel. This is because of the potential increased risk of bleeding in those with raised right sided pulmonary pressures.

Cardiac surgery is the only definitive treatment for carcinoid heart disease and should be considered in all those with symptoms and evidence of severe valvular disease.⁶ Medical treatment includes the use of somatostatin analogues (e.g. octeotide and lanreotide), which bind to the tumour receptors and prevent the release of hormones into the circulation, relieving patients of their symptoms.

Median survival following the onset of

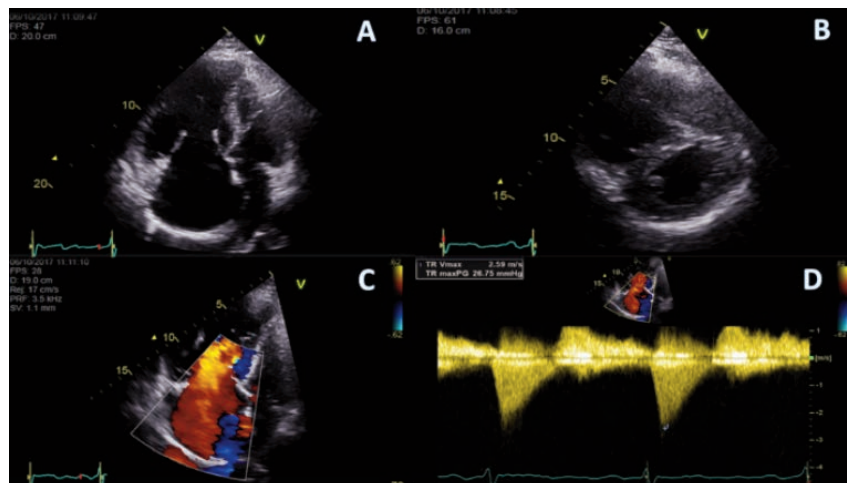


Figure 1. A) Dilated right ventricle on apical 2 chamber view; B) Flattening of left ventricular septum in diastole on parasternal short axis view; C) Severe tricuspid regurgitation on apical 2 chamber view with colour Doppler; D) Triangular pattern of tricuspid regurgitation on pulse wave Doppler.

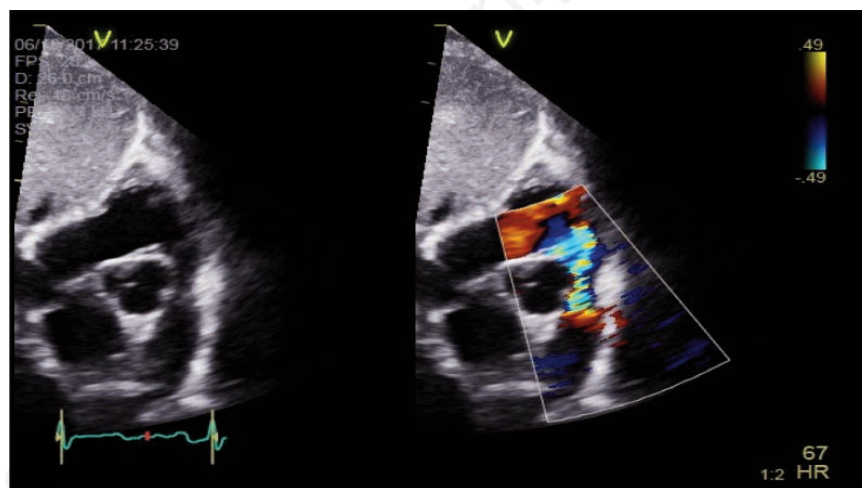


Figure 2. Echocardiography demonstrates thickened pulmonary valve leaflets and pulmonary stenosis (subcostal short axis view).

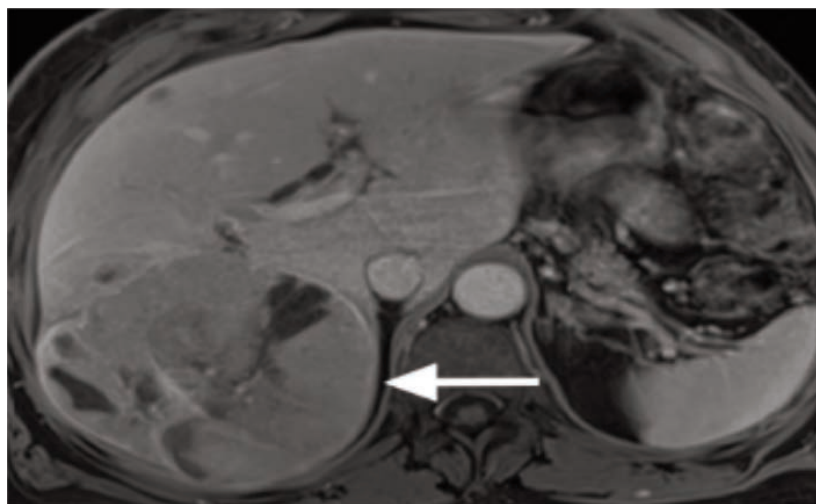


Figure 3. Magnetic resonance imaging axial T1 Dixon water post gadolinium image shows a large, heterogeneously enhancing mass (arrow) in the right lobe of the liver with central necrosis.

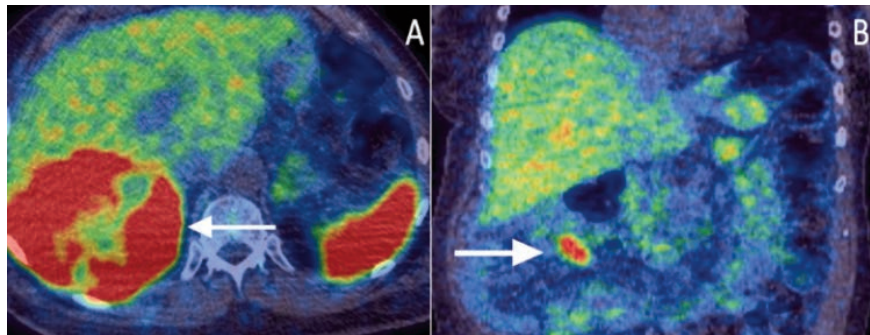


Figure 4. A) Fused Ga68-DOTATATE PET/CT imaging demonstrates corresponding intense tracer uptake in the liver mass (arrow) with central photopaenia (axial image panel A); and B) focal intense tracer uptake in a small bowel loop (arrow) in the right lower quadrant (coronal image panel B).

symptoms of 4.8 years has been demonstrated in one retrospective study of 200 patients post cardiac surgery.⁷

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