Cardiology in the Young

cambridge.org/cty

Coronary artery occlusion secondary to graft versus host disease after bone marrow transplant in a 21-year-old

Sihong Huang[1,3], Paul Martin[2] and M. Jay Campbell[1,3]

[1]Department of Pediatrics, Division of Pediatric Cardiology, Duke University, Durham, NC, USA, [2]Department of Pediatrics, Division of Bone Marrow Transplantation, Duke University, Durham, NC, USA and [3]Duke Cardiovascular Magnetic Resonance Center, Durham, NC, USA

Brief Report

Cite this article: Huang S, Martin P, Campbell MJ. (2018) Coronary artery occlusion secondary to graft versus host disease after bone marrow transplantation in a 21-year-old. *Cardiology in the Young* **28**: 1484–1486. doi: 10.1017/S1047951118001592

Received: 10 May 2018
Revised: 5 July 2018
Accepted: 10 August 2018
First published online: 17 September 2018

Key words:
Cardiovascular magnetic resonance; delayed enhancement imaging; bone marrow transplant; graft verses host disease; coronary artery disease

Author for correspondence:
M. J. Campbell, MD, Department of Pediatrics, Division of Pediatric Cardiology, Duke University, 2301 Erwin Road, Children's Health Center, 1st Floor, Room 1921B, Durham, NC 27710, USA. Tel: 919-684-3574; Fax: 919-681-5903; E-mail: michael.campbell2@duke.edu

Abstract

Coronary artery disease after bone marrow transplantation is rare in children and young adults. We report the case of a 21-year-old who developed coronary artery disease and acute myocardial infarction secondary to graft versus host disease following bone marrow transplantation. Physicians caring for young patients after bone marrow transplantation should be aware of the potential for coronary artery disease and evaluate appropriately.

Case presentation

A 21-year-old man with a history of Diamond–Blackfan anaemia, myelodysplastic syndrome, bone marrow transplantation, and graft versus host disease presented to an outside emergency room with acute chest pain, electrocardiogram changes, and elevated cardiac enzymes. He had a history of a bone marrow transplant at 17 years of age secondary to myelodysplastic syndrome (chromosome 1:7 translocation). His pre-transplant cardiac work-up was normal. He underwent conditioning with total body irradiation and melphalan, followed by bone marrow transplantation with grafts from an unrelated donor (10/10 human leukocyte antigen-matched and ABO mismatched). He demonstrated engraftment on day +29, but required an additional CD34 stem cell transfusion on day +77 secondary to poor graft function. On day +67, he developed grade IV graft versus host disease of the skin with painful scleroderma requiring initial treatment with methylprednisolone, cyclosporine, and daclizumab infusions. He continued chronic treatment with azathioprine and photochemotherapy for three years.

On presentation to the emergency room, a 12-lead electrocardiogram demonstrated new-onset right-bundle branch block with ST-segment depression in leads V1 to V3. Cardiac enzymes were elevated as follows: troponin – I 2.19 mg/mL, normal <0.04; creatine kinase-MB – 20.5 ng/mL, normal 0–4.5; creatine phophokinase – 278 IU/L, normal 55–170. A limited transthoracic echocardiogram demonstrated severely depressed left ventricular systolic function with a left ventricular ejection fraction of 25%. Aspirin and metoprolol were given. Cardiac enzymes continued to rise, prompting transfer to a tertiary care institution.

On the evening after transfer, he developed haemodynamically stable complete heart block prompting discontinuance of metoprolol. Cardiac catheterisation with coronary angiography was deferred given the significant graft versus host disease in the inguinal area. Cardiac MRI was performed with a 1.5 T Siemens Avanto magnet. Cine cardiac MRI images revealed a wall motion abnormality in the inferior left ventricular wall and a left ventricular ejection fraction of 55% (Supplementary Video 1). Wall motion abnormalities were also observed in the diaphragmatic and basal free wall of the right ventricle. Late gadolinium delayed enhancement imaging showed a transmural infarct in the inferior left ventricular wall extending from the base to the apex and in the right ventricular basal and free wall consistent with infarction involving the right coronary artery distribution (Fig 1, Supplementary Video 2). Subsequent CT angiogram of the chest with coronary angiography showed complete occlusion of the proximal right (Fig 2) and 50% occlusion of the left anterior descending coronary arteries. Luminal irregularity was present to a less extent throughout the remainder of the coronary arteries, consistent with coronary vasculitis. Given the transmurality of the infarction and lack of viable myocardium, the patient was not a candidate for reperfusion interventions.

Medical treatment with captopril, simvastatin, furosemide, and metoprolol – following spontaneous conversion to sinus rhythm – was initiated. At three weeks after admission he

CAMBRIDGE UNIVERSITY PRESS

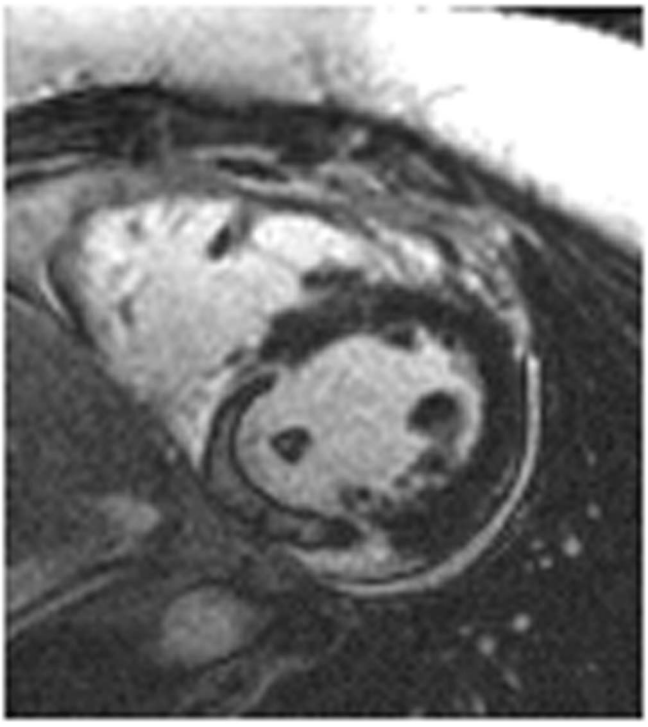

Figure 1. A late delayed gadolinium enhancement image obtained using gradient echo imaging. This short-axis image at the mid-ventricular level illustrates hyperenhancement in the right ventricular inferior and free walls right ventricular inferior and free wall. There is also hyperenhancement of the left ventricular inferoseptal, inferior and inferolateral walls. There is an area of no re-flow in the centre of the infarction.

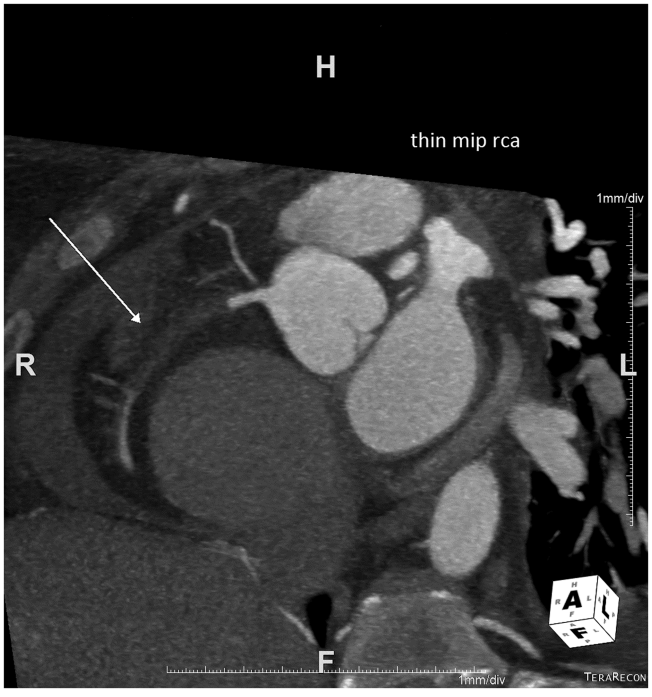

Figure 2. An image of a CT angiogram of the chest with coronary angiography that illustrates complete occlusion of the proximal right coronary artery.

developed a large posterior pericardial effusion with no echocardiographic evidence of tamponade. Because of the posterior location, percutaneous drainage was not feasible and medical management was initiated. Despite escalation of medical therapy, the next morning the patient had an acute cardiac arrest. Resuscitation efforts were initiated but discontinued at the family's request.

Discussion

Coronary artery disease is a known but rare complication of paediatric bone marrow transplantation.[1,2] Causes of coronary artery disease following bone marrow transplantation include radiation, chemotherapy, infection, and graft versus host disease.[1,3–5] Given the patient's history of severe graft versus host disease and CT findings consistent with coronary artery vasculitis, graft versus host disease was considered to be the most likely aetiology. Unfortunately, an autopsy was not performed, and thus histologic confirmation was not possible. To the best of our knowledge, there have been six reported cases of coronary artery disease related to graft versus host disease in children following bone marrow transplantation, with only two survivors.[2,6–10] In summary, coronary artery disease should be considered in children who have undergone bone marrow transplantation, particularly those with graft versus host disease.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/S1047951118001592

Financial Support. None

Conflicts of Interest. None

Ethical Standards. The authors assert that all procedures contributing to this work comply with the relevant national guidelines on human experimentation and with the Helsinki Declaration of 1975 as revised in 2008.

References

1. Rackley C, Schultz KR, Goldman FD, et al. Cardiac manifestations of graft-versus-host disease. Biol Blood Marrow Transplant 2005; 11: 773–780.
2. Gatt M, Liebster D, Leibowitz D, Matzner Y. Acute myocardial infraction after bone marrow transplantation: an unsuspected late complication. Ann Hematol 2003; 82: 136–138.
3. Cazin B, Gorin NC, Laporte JP, et al. Cardiac complications after bone marrow transplantation. A report on a series of 63 consecutive transplantations. Cancer 1986; 57: 2061–2069.
4. Hertenstein B, Stephanic M, Schmeiser T, et al. Cardiac toxicity of bone marrow transplantation: predictive value of cardiac evaluation before transplantation. J Clin Oncol 1994; 12: 998–1004.
5. Lee PJ, Mallik R. Cardiovascular effects of radiation therapy: practical approach to radiation therapy-induced heart disease. Cardiol Rev 2005; 13: 80–86.
6. Chan KW, Taylor GP, Shepherd JD, Shepherd WE. Coronary artery disease following bone marrow transplantation. Bone Marrow Transplant 1989; 4: 327–330.
7. Wang B, Cao LX, Jiang M, Hu LD. Myocardial infarction following allogeneic bone marrow transplantation. Bone Marrow Transplant 1996; 18: 479–480.

8. Miura T, Izawa A, Kumazaki S, et al. Acute myocardial infarction in a 16-year-old girl with chronic GVHD. Bone Marrow Transplant 2010; 45: 1576–77.
9. Prevost D, Taylor G, Sanatani S, Schultz KR. Coronary vessel involvement by chronic graft-versus-host disease presenting as sudden cardiac death. Bone Marrow Transplant 2004; 34: 655–656.
10. Scudiero L, Soriano F, Morici N, et al. Allogeneic peripheral blood stem cell transplantation and accelerated atherosclerosis: An intriguing association needing targeted surveillance. Lessons from a rare case of acute anterior myocardial infarction. Eur Heart J Acute Cardiovasc Care 2016; pii: 2048872616652311. doi: 10.1177/2048872616652311.

https://doi.org/10.1017/S1047951118001592 Published online by Cambridge University Press