Assessment of Malnutrition-Related Cardiomyopathy in Adolescent Burn Patients

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Significance

Systolic and diastolic dysfunction (cardiomyopathy) may occur in a high percentage of patients with large TBSA burns, and early detection may improve outcome.

Introduction

- Reversible cardiomyopathy in large burns may be due to many factors: thermal injury, sepsis, or severe malnutrition.
- With time and adequate nutrition, cardiac function in our case series improved, although many remained with mild dysfunction in the first year.
- Monitoring nutritional status is an integral part of improving post-burn cardiomyopathy.
- Additionally, echocardiography can be used to assess cardiomyopathy and alter perioperative treatment in these patients.

Methods

- Serial transthoracic and transesophageal echocardiographic parameters were measured during perioperative care (ejection fraction, fractional shortening, pericardial fluid) in 4 patients with evidence of malnutrition (low BMI, low albumin and prealbumin, muscle wasting) and a delayed presentation to the hospital. Initial echocardiography was performed post-injury day 30 - 142; follow-up exams were performed in some patients at 2 years post-injury. Acutely-injured and septic patients are not included.

Results

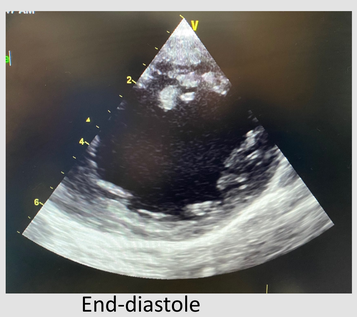
- Echocardiographic measurements were obtained in 4 patients, ages 7-21. The TBSA ranged from 33-95% and included flame injury and electrical burns. The initial ejection fraction ranged from 12-38% in patients with a BMI range of 10-16. The mean initial albumin was 1.65g/dL; the mean prealbumin was 10.8mg/dL. One patient had a moderate pericardial effusion, which resolved after 1 month of proper nutrition. Selenium deficiency was noted in 1 patient. Dobutamine was required intraoperatively in several patients.

Conclusion

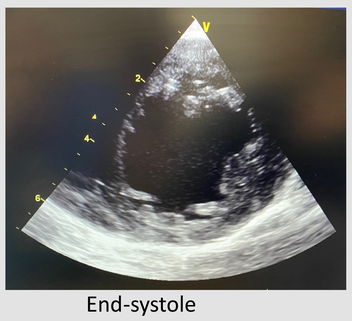
Patients presenting with malnutrition all had evidence of delayed wound healing and cardiomyopathy of varying degrees; BMI on admission showed a strong correlation with the degree of myocardial depression.

ID (randomly assigned)	Age	TBSA %	Time from Burn to Admission	Initial BMI	Initial Ejection Fraction
Patient 1	21	82%	4 months	16	15%
Patient 2	7	33%	2 months	16	38%
Patient 3	11	35%	4 months	10	12%
Patient 4	15	95%	12 months	15	22%

Patient 3 on admission

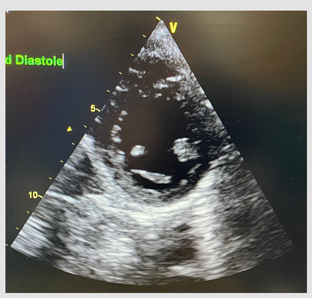


End-diastole



End-systole

8 months post-admission



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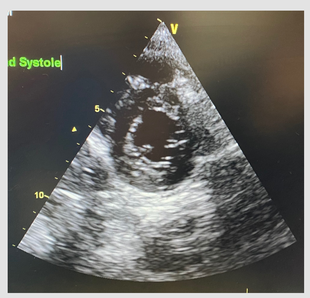
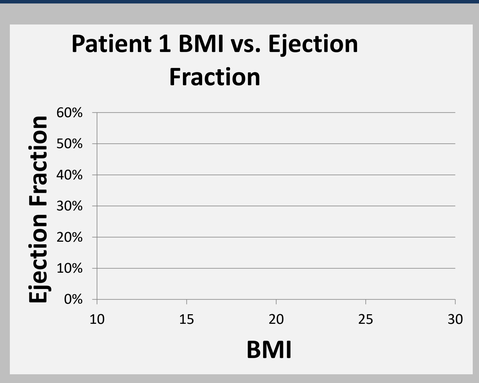
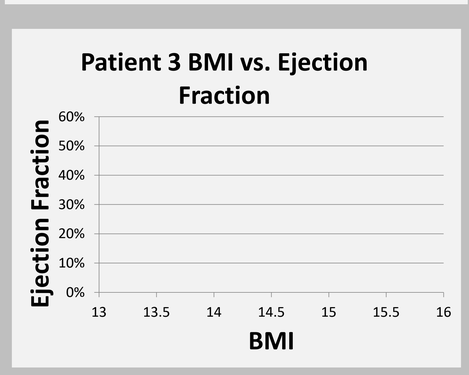
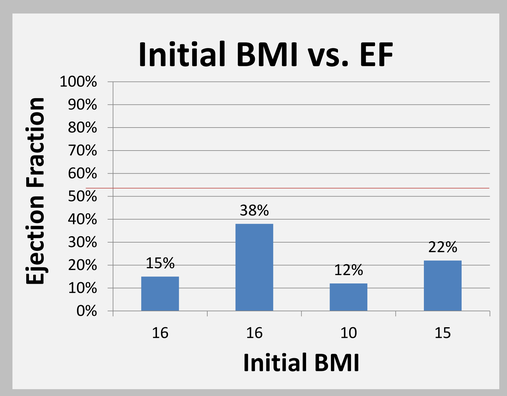


End-systole







Lessons

- Adolescent burn patients presenting with malnutrition should be rapidly assessed for myocardial dysfunction.
- Echocardiography can be used perioperatively to tailor management in patients with malnutrition and should be considered in patients with burn shock or sepsis.
- Improved nutritional status correlates with a reduction in the degree of myocardial dysfunction.

Selected References

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--Howard et al. J of Burn Care Research 2013; 34 (1): 413-419.
--Abu Fadden et al. Ann Pediatric Cardiology 2010; 3 (2): 113-118.
--Mak et al. J of Burn Care research2006; 27: 482-486.