On-line Case Report

Disparity in the risk stratification of major surgery

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ABSTRACT

This case report illustrates the dilemma of risk prediction. In the objective documentation of peri-operative risk, cardiopulmonary testing offers a holistic assessment. At present, availability is limited and, as such, it is important to be mindful of the limitations of other more traditional forms of risk assessment.

Keywords: Risk assessment – Abdominal aortic aneurysm

A 74-year-old man presented to the vascular surgical unit with an incidental finding of a 7.5 cm abdominal aortic aneurysm (AAA), detected on plain lumbar spine X-ray and confirmed on ultrasound examination. The president of a local tennis association, he demonstrated excellent exercise tolerance on clinical assessment. Based upon the most recent revision of the American Heart Association (AHA) classification of heart failure, he was categorised as 'ID'.¹

Two years previously, he had presented to his general practitioner with increasing breathlessness without chest pain. A referral to the cardiology service at the time yielded the results summarised in Table 1.

Medical management was optimised with an ACE inhibitor and a β -blocker in addition to his regular diuretic. It was felt that revascularisation would not improve his cardiac function.

CT angiography confirmed a 7.5 cm infrarenal abdominal aortic aneurysm extending into both common iliacs whose anatomy was incompatible with endovascular repair. Cardiopulmonary exercise testing was performed in order to quantify his risk more accurately prior to discussion of an open repair (Table 2): he was subsequently graded as

low-to-medium risk with a predicted risk of death of 5–10% in the first month after surgery. Specifically, it was noted that

Table 1 Earlier cardiology service results

Resting ECG

Sinus rhythm
Left axis deviation
Intraventricular conduction delay
Poor R-wave progression
Lateral T-wave inversion

Transthoracic echocardiography

Severe LV dysfunction
Dilated LV
No segmental akinesis

Angiography

Global hypokinesis~
Ejection fraction 11%
No mitral regurgitation
Severe stenosis LAD after 1st diagonal and of 1st diagonal

Cardiac MRI

As per angiography
No significant delayed hyperenhancement

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Table 2 Results of cardiopulmonary testing

Measurement	Recorded value	Predicted value	Difference (%)
FVC (l)	3.43	3.64	-6
FEV ₁ (l)	2.44	2.63	-7
FEV ₁ /FVC (%)	71	73	-3
Peak VO ₂ (ml/min)	1604	1676	-4
Peak power (W)	120	135	-11
Anaerobic threshold (ml/kg/min)	10.5	9.2	14
Peak heart rate	148	146	1.4
Peak O ₂ pulse	11	13	-15
VO ₂ /W-slope (ml/min/W)	9.3	10	-7
VE/CO ₂ at anaerobic threshold	33	31	6.5
Peak stroke volume (ml)	85.9		

he had evidence of cardiac dysfunction (reduced stroke volume and relative tachycardia per given oxygen consumption).

Open repair with a bifurcated graft was undertaken without intra- or postoperative complication. A predicted mortality risk of 5–10% was quoted in the informed consent. General anaesthesia and a thoracic epidural were employed with a clamp time of 63 min and cell salvage. No allogenic blood was transfused.

Six weeks post discharge, the patient was admitted under the medical team with acute left ventricular failure presenting as shortness of breath responding to a short course of intravenous diuretic. At surgical follow-up a further 6 weeks later, the patient was asymptomatic.

Discussion

Elective abdominal aneurysm repair has been shown to carry a mean mortality risk of 7.4%,² although there is evidence from systematic review and meta-analysis that centres with higher throughput may have improved results.³

A survey-based study demonstrated considerable variations in the pre-operative assessment of such patients.⁴ It has been argued that simple measurement of ejection fraction is of no value in the risk stratification of patients with aneurysms suitable for open repair.⁵ whilst cardiopulmonary exercise testing with measurement of PVO₂ may be helpful in identifying patients more at risk of postoperative complications, although this should not be used in isolation without thorough clinical assessment.⁶

More recently, the value of cardiopulmonary testing in predicting mortality following elective AAA repair has been evaluated with the conclusion that pre-operative CPX testing, combined with simple co-morbidity scoring,

identifies patients unlikely to survive in the mid-term, even after successful AAA repair.⁷

Conclusions

This case report illustrates the dilemma of risk prediction. In the objective documentation of peri-operative risk, cardiopulmonary testing offers a holistic assessment. At present, availability is limited and, as such, it is important to be mindful of the limitations of other more traditional forms of risk assessment.

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