EDITORIAL

Is there a place for D-dimers in acute type A aortic dissection?

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Plasma concentrations of D-dimer may prove a valuable addition in the diagnostic work-up of acute type A aortic dissection, but not as means of predicting mortality

In a paper in this issue of *Heart*, Weber and colleagues try to show that plasma concentrations of D-dimer may predict mortality in acute type A aortic dissection (AADA).¹ The study was conducted on 27 patients of which 10 (37.0%) did not receive surgical treatment. Reasons for this should be published and discussed in depth, since mortality following conservative treatment is unacceptably high. Overall mortality in the study collective was 48.1%. Unfortunately, there is no information available about surgical or medical mortality, which would be of interest. Plasma D-dimers are a degradation product of cross-linked fibrin and the fact that plasma concentration of D-dimer increase in AADA is not surprising at all, since the thrombogenicity of the false lumen is the main factor to activate the whole coagulation cascade. With regard to this, it would be of interest to know more about the extent of AADA.² Patients with De Bakey type II dissection (limited to the ascending aorta) would be expected to have significant lower D-dimers than patients with De Bakey type I dissection (including ascending aorta, arch, descending and abdominal aorta) or patients suffering from additional malperfusion syndrome (MPS). MPS is present in around one third of the patients presenting with AADA and probably also affects plasma concentrations of D-dimer.

It is well known that the presence of MPS increases mortality³ and outcome of patients suffering from De Bakey type I dissection compared to De Bakey type II dissection is probably poorer, since the extent of the disease is more extended. Additionally, the authors reported a correlation of the degree of elevation of D-dimer plasma concentration in a previous study from the onset of symptoms to laboratory testing, which is not mentioned in the present manuscript. The delay of diagnosis and treatment in the group of patients with higher D-dimer concentrations alone could be an explanation for poorer outcome.²

DIAGNOSIS AND FOLLOW-UP OF TYPE A AORTIC DISSECTION

Measurement of D-dimers may be a valuable addition to the current diagnostic work-up of patients with suspected AADA.⁴ However, also

after repair of AADA hypercoagulable conditions may persist if a patent false lumen is present.⁵ A patent false lumen can better be observed by computed tomographic scan or magnetic resonance imaging, which is mandatory in the follow-up of patients after successful surgical repair of AADA for early detection of late dilatation of the diseased aortic arch and/or descending aorta.^{6,7} We have recently shown that mainly patients with a large area of the false lumen (larger than 70% of the total area of the transection of the aorta) are at higher risk for late dilatation.⁷

DANGER OF PREDICTING MORTALITY

In our opinion, prediction of mortality in AADA, based on D-dimer concentrations, may be extremely dangerous, because it may lead to unjustified exclusion of patients who may survive the operative routine easily. Further, this conclusion is not supported by the data presented in the study by Weber and colleagues.¹ To draw such a conclusion, D-dimer concentrations should be assessed in a representative collective, focusing on the possible side effects, as many factors influence D-dimer values. The study population of 27 patients is very small and overall outcome is poor with a mortality of 48.1%. Contemporary mortality may be as low as 3-10% in experienced institutions.^{8,9} This is mainly due to technical refinements in perfusion, with subclavian artery cannulation for arterial return, cerebral protection, with antegrade cerebral perfusion, and surgical technique, such as the open distal anastomosis technique and the use of gelatine-resorcin-formaldehyde (GRF) glue. In selected cases only (age > 80 years, central nervous malperfusion syndrome with severe preoperative cerebral deficit, prolonged reanimation or other severe co-morbidities) indication for surgery should be restrictive. In all other cases, improvement of surgical outcome does not justify a conservative treatment with an expected mortality of 50% in the first 48 hours after onset of symptoms. Beside aspects of immediate outcome, mid to long term results, especially quality of life (QoL), are of increasing interest after major surgical procedures. We were able to demonstrate that the introduction of antegrade cerebral perfusion, combined with cannulation of the subclavian artery, clearly improves mid-term QoL. With this technique, mid-term QoL of

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Abbreviations: AADA, acute type A aortic dissection; DHCA, deep hypothermic circulatory arrest; GRF, gelatine-resorcin-formaldehyde; MPS, malperfusion syndrome; QoL, quality of life

patients with operated AADA and deep hypothermic circulatory arrest (DHCA) up to 30 minutes is similar with an age and sex matched standard population.¹⁰

Plasma concentrations of D-dimer are an interesting tool and a valuable addition in the diagnostic work-up of AADA. However, prediction of mortality and indication to proceed or not with emergency surgery should certainly not be based on a D-dimer, or on any other laboratory value. The majority of patients are suitable for surgery and should therefore be sent immediately to a cardiac surgical department, where surgery can be performed with a low mortality and results in the majority of patients having a good mid-term outcome with normal quality of life.

REFERENCES

- 1 Weber T, Rammer M, Auer J, *et al.* Plasma concentrations of D-dimer predict mortality in acute type A aortic dissection. *Heart* 2006;**92**:836–7.
- 2 Weber T, Högl S, Auer J, *et al.* D-dimer in acute aortic dissection. *Chest*, 2003;**123**:1375–8.
- 3 Tanaka H, Okada K, Yamashita T, *et al.* Surgical results of acute aortic dissection complicated with cerebral malperfusion. *Ann Thorac Surg* 2005;**80**:72–6.
- 4 Eggebrecht H, Naber CK, Bruch C, *et al.* Value of plasma fibrin d-dimers for detection of acute aortic dissection. *J Am Coll Cardiol* 2004;**44**:804–9.
- 5 Nomura F, Tamura K, Yoshitatsu M, *et al.* Changes in coagulation condition, cytokine, adhesion molecule after repair of acute type A aortic dissection. *Eur J Cardiothorac Surg* 2004;**26**:348–50.
- 6 Immer FF, Hagen U, Berdat PA, *et al.* Risk factors for secondary dilatation of the aorta after acute type A aortic dissection. *Eur J Cardiothorac Surg* 2005;**27**:654–7.
- 7 Immer FF, Krähenbühl E, Hagen U, *et al.* Large area of the false lumen favors secondary dilatation of the aorta after acute type A aortic dissection. *Circulation* 2005;**112**:1249–52.
- 8 Shiono M, Hata M, Sezai A, *et al.* Surgical results in acute type A aortic dissection. *Ann Thorac Surg* 2005;**11**:29–34.
- 9 Immer FF, Krähenbühl E, Immer-Bansi AS, *et al.* Quality of life after interventions on the thoracic aorta with deep hypothermic circulatory arrest. *Eur J Cardiothorac Surg* 2002;**21**:10–4.
- 10 Immer FF, Lippeck C, Barmettler H, *et al.* Improvement of quality of life after surgery on the thoracic aorta: effect of antegrade cerebral perfusion and short duration of deep hypothermic circulatory arrest. *Circulation* 2004;**111**:250–5.

Obituary

Sir Brian Barratt-Boyes KBE

Sir Brian Barratt-Boyes, who died 8 March age 82, was a pioneering New Zealand cardiac surgeon. He was born in Wellington, New Zealand on 13 January 1924. He was educated at Wellington College and Victoria University before going on to study at Otago's Medical School, graduating in 1946. He continued his training as a surgeon, initially in New Zealand and later at the Mayo Clinic, Rochester, USA from 1953–5. Then as a Nuffield Fellow he worked in Bristol from 1955–6. At the Mayo Clinic he worked with John Kirklin who was at that time developing the techniques of open heart surgery. The two became firm friends and subsequently joint authors.

Barratt-Boyes was recruited back to New Zealand in 1956 by Sir Douglas Robb and in 1958 performed the first operation on cardiopulmonary bypass in New Zealand at Green Lane Hospital, Auckland. Under his pioneering leadership, the unit thrived and in 1962 he started using homograft aortic valves for aortic valve replacement with excellent results. His first patient is still alive, having had her first replacement valve re-replaced by Barratt-Boyes after 25 years.

In the 1960s although there had been many advances in the surgery for congenital heart disease, the results in infants were poor throughout the world. Using a technique of deep hypothermia and circulatory arrest which had been developed in Kyoto, Japan, Barratt-Boyes obtained excellent results with early correction in infants who would otherwise have had palliation and later correction. Although this technique was cumbersome, it was adopted by many other surgeons throughout the world with steadily improving results. With the subsequent improvements in cardiopulmonary bypass, it was largely abandoned by the late 1980s. However, it was the pioneering work and techniques of Barratt-Boyes that showed that many complex conditions could be safely corrected in infancy. Many young surgeons from all over the world were attracted to train with Barratt-Boyes and the excellent team he had established. They in turn returned to their countries to put to good use the techniques learned in Auckland.

Barratt-Boyes was appointed CBE in 1966 and knighted in 1971. He published many papers, mostly about homograft valves and surgery for congenital heart

disease. He contributed to a large number of international meetings and in 1985 he and his old friend John Kirklin published their monumental book *Cardiac Surgery*, which became the standard book for the subject. He received many honours including being made the first Honorary Professor of the University of Auckland in 1971. He retired in 1988 and in 1995 his face appeared on one of New Zealand's postage stamps; one of few living New Zealanders to have this honour.

He was enormously dedicated, a brilliant teacher and a superb technician. He built an outstanding team around him and the unit developed a well deserved reputation. Sadly his own health was marred by the need for two operations for coronary artery disease and in his last few months he became severely short of breath. He had a double valve replacement at the Cleveland Clinic, but died a few days later.

He married Norma Thompson in 1949 and they had five sons. The marriage was dissolved in 1986 and he then married Sara Monestar.

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