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Editorial

Imaging the dissected aorta

Confidence in the diagnosis of whether a patient has or does not have aortic dissection is essential in the management of patients in whom this lethal condition is suspected. Ideally we would like to make the diagnosis quickly, safely, and "on site".

Acute aortic dissection is, of its nature, unheralded and patients present at any emergency port of call under several guises and in various states. Sometimes the diagnosis seems almost certain on clinical grounds and urgent resuscitation leading to expeditious surgery is essential to save the patient's life. These circumstances require a rapid test to confirm the diagnosis. On other occasions when the clinical condition has been stable and the diagnosis is more likely to be elusive a more cautious and more thorough investigation is indicated. To distil the debate about which test to use down to percentages of sensitivity and specificity[1 2] in my view neglects the main issues in the problem of diagnosis of aortic dissection and may distract us from more important matters in treating the patient. I believe that in this instance statistics derived from simple 2 × 2 contingency tables, which rely on claims for a "positive" or "negative" result, can fail to clarify the problem.

The possible diagnostic tests are (in alphabetical order)

- Aortography
- Computed tomography (CT)
- Intravenous digital subtraction angiography (DSA)
- Magnetic resonance imaging (MRI)
- Transoesophageal echocardiography (TOE)
- Transthoracic echocardiography (TTE)

These tests are not universally available, they are not universally applicable, and they cannot be performed to a uniform standard under all circumstances.[3]

Echocardiography is highly operator dependent, both in obtaining and interpreting the images obtained. Aortography requires skill, judgment, and experience to obtain the pictures which will make or refute the diagnosis. CT is less operator dependent and the images are available for subsequent inspection but they are still open to interpretation. We may have a highly experienced, skilled, and committed echocardiographer whose results are compared with a keen but green registrar in the catheter laboratory—or vice versa. Knowing this, it seems fatuous simply to declare a test "positive" or "negative" and enter it into one or other box of a 2 × 2 table. Even if this were methodologically reasonable, which it is not, the fact remains that the state of the patient, the degree of stability or instability, the time since onset, the level of clinical suspicion, the time of day, and—inescapably—the availability of the test on that site may override theoretical considerations of 90%, 95%, or 99% sensitivity.

The sensitivity of all these tests (that is the power of the test to diagnose the condition when present) is high. If studies are conducted in series with a high prevalence of the disease then the positive predictive value is also high. If the prevalence is lower, as it will be when tests are performed in the less selected group of patients in the district general hospitals, the positive predictive value falls owing to an inevitable and inescapable increase in the effect of false positives in the overall population sampled.[4]

To pursue the bayesian approach a little further, it could be argued that in practice specificity is more important than sensitivity. The group selected for these tests are acutely unwell and will remain under close supervision. Dissection is an important diagnosis to exclude because plans for urgent transfer for surgery can be set aside and local management, perhaps with thrombolysis, can be expedited.

In the diagnosis of aortic dissection there are three stages:

Is there dissection of the aorta?

Is the ascending aorta involved?

What else do we need to know to manage the case ideally?

There is more to diagnosis than a "positive" or "negative" result.[5 6]

If the situation is acute and merits urgent management any test that confidently supports our clinical decision that the ascending aorta is involved in the dissection is enough to prompt immediate implementation of the surgical plan. Then availability, speed, and safety are the overriding considerations. In our hands, within a cardiothoracic unit with a high level of echocardiographic expertise, TOE is a valuable technique. It can be performed in the intensive therapy unit, in the anaesthetic room, and throughout the operation.[7 8] However, if a patient comes to us with a diagnostic quality CT we use that. We use aortography if the condition is sufficiently stable and the clinicians involved are more comfortable with the longitudinal image of the aorta or seek to clarify some point of anatomy in a view that is familiar to them.

In the more elective case when surgery can be planned days, weeks, months, or even years after the acute event, the situation is progressively more stable and merits commensurately more detailed information. Then we can ask how far does the dissection extend? Which vessels in the arch are involved? Which lumen supplies the kidneys? With increasing experience we will use MRI in this context. A simple trade off of one percentage sensitivity against another does nothing to address these complex questions in the diagnosis and operative decisions that have to be made in patients with aortic dissection.

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