Correspondence

From balloons to stents and back again?

Dear Sirs,

Ischaemic heart disease (IHD) is a major cause of mortality and morbidity, and percutaneous coronary intervention (PCI) is a mainstay of treatment. The management of IHD has been revolutionised by major advancements in the field of coronary angioplasty, starting with the use of balloons for percutaneous transluminal coronary angioplasty (PTCA) in 1977 by Gruentzig.[1] However, their use was limited by acute recoil (approximately 40%), vessel dissection and a high re-stenosis rate (50%). To treat the acute problems of recoil and dissection (with acute vessel closure) and reduce the rate of re-stenosis, coronary stents were introduced in 1986,[2] and became the standard PCI technique in the ensuing decade.

However, new problems emerged in the form of in-stent re-stenosis (ISR) as a result of injury, inflammation and neo-intimal hyperplasia caused by proliferation and migration of vascular smooth muscle cells, occurring within six to nine months post-procedure in 20–30% of cases.[3,4] In addition, the endothelial injury and inflammation caused by stent implantation result in platelet activation and thrombosis.[5,6] Drug-eluting stents (DES) evolved in order to reduce the incidence of re-stenosis and re-intervention, and showed a definite benefit over bare metal stents (BMS) (4–6% *vs.* 20–30% ISR).[7] Unfortunately, problems still persist, with incomplete healing seen in DES at 180 days as compared with BMS,[8] resulting in recommendations for prolonged dual antiplatelet therapy (DAPT), while stent thrombosis persists, with current generation stents showing rates of around 1% at 12 months with a significant mortality rate.[9]

Stents with biodegradable polymers (controlled release of drug followed by biodegradation of the polymer leaving bare metal only), polymer-free stents (drugs coated directly onto the metallic surface) and biodegradable scaffolds (complete resorption after a definite period of time, leaving the vessel virtually metal-free) have been developed to combat such problems, but re-stenosis and stent or scaffold thromboses still occur.[10]

Perhaps we need to re-visit the reason for stent implantation. The Benestent trial showed a very low bail-out rate for plain old balloon angioplasty (POBA) (5%), suggesting that the acute (in-lab) problems requiring stenting are minimal, such that the major reason for many implants is fear of re-stenosis and subsequent repeat revascularisation.[11] Can re-stenosis be reduced without the use of a metallic cage? Drug-coated balloons (DCB) offer this possibility through the very uniform delivery of paclitaxel to the vessel wall. The current data support their use in ISR, including a National Institute for Health and Care Excellence (NICE) recommendation for use in BMS ISR.[12] They have been associated with a low late loss in side branch ostia, small vessels and peripheral vessels.[13-15] *De novo* PCI with a DCB-only strategy is now being performed and registry data show very promising results with low major adverse coronary events (MACE) and target lesion revascularisation (TLR).[16] DCB-only treatment has recently been shown to result in a late lumen gain (for the first time in PCI).[17] But long-term, randomised-controlled studies are lacking and the presence of elastic recoil or dissections can be a deterrent for some operators. The technology is promising and requires development, further study and a willingness to put aside the safety net we have become most comfortable with – the stent.

Conflict of interest

None declared.

Usha Rao, Cardiology SpR

Simon C Eccleshall, Consultant Cardiologist
(simon.eccleshall@nnuh.nhs.uk)

Norfolk & Norwich Hospital, Colney Lane, Norwich, NR4 7UY

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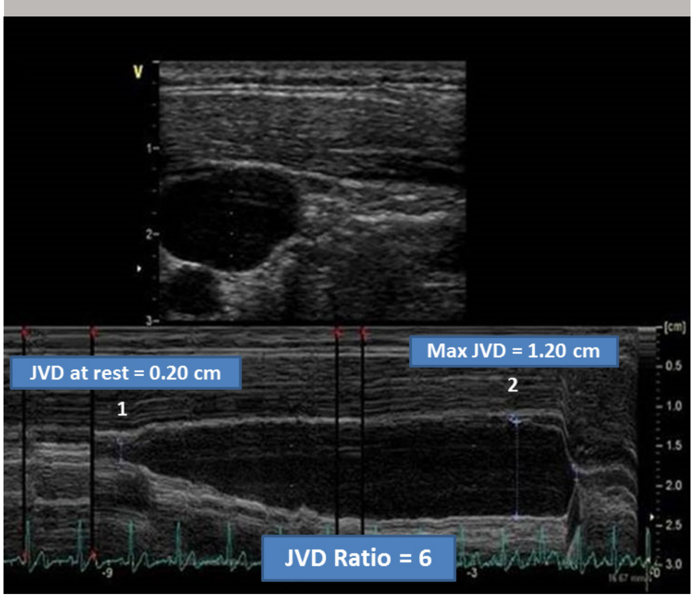
Newer technologies and jugular venous pressure

Dear Sirs,

We read with interest the article by Dr Ward in the *BJC*, and we greatly welcome his refreshing physiological overview of the jugular venous (JV) pulse.[1] We might, however, not have been quite so dismissive of modern technology. Although Paul Wood was concerned not to place too much reliance on machines ("… we are in danger of losing our clinical heritage and of pinning too much faith in figures thrown up by machines."),[2] the superb film cited (http://archive.org/details/Thejugularvenouspulse-wellcome) makes it clear that he, too, was not averse to using the technology of the day where appropriate.

The height of the JV pressure is an important prognostic marker in patients with heart failure.[3] However, many doctors are now not familiar with its measurement, and the reported height of the JV pressure is not highly reproducible when measured clinically.[4] It is straightforward to make an estimate of right atrial pressure from the inferior vena cava (IVC) diameter particularly with the widespread availability of echocardiography. In ambulatory heart failure patients, echocardiographic evaluation of IVC diameter provides similar prognostic information to that obtained from natriuretic peptides.[5] An ultrasound probe can also be used in the neck of patients and can tell what even a highly skilled doctor might have missed if, for instance, the habitus of the patient does not allow a simple identification of the internal jugular vein. Different methods are possible. By using a 10 MHz ultrasound probe, we described how the ratio between JV diameter during a Valsalva manoeuvre to that at rest (**figure 1**) identifies those ambulatory patients with heart failure and raised natriuretic peptides, but also with more severe right ventricular dysfunction and raised pulmonary artery pressure.[6] We have also recently presented preliminary results, showing that this method can provide independent prognostic information.[7] Some other researchers have measured the cross-sectional area of the internal jugular vein, rather than its diameter. Again, the response of the vein area to respiratory manoeuvres can easily identify those patients who have elevated right atrial pressures invasively measured.[8] Other devices are currently being explored and it seems they can provide accurate and reproducible non-invasive reading of the right atrial pressure in most of the cases.[9]

Figure 1. With the patient reclining with head elevated 45°, the internal jugular vein (JV) is identified and then JV diameter and its changes measured continuously by M-mode ultrasound using a linear high frequency probe (10 MHz) at rest and during a Valsalva manoeuvre. The ratio between maximum JV diameter obtained during Valsalva (2) and diameter at rest (1) is calculated (JVD ratio). For this patient, the JVD ratio is equal to 6



Although we agree with Ward that continuing training on JV pressure assessment is mandatory, we have to recognise that for many clinicians it is a difficult sign to elicit and that modern technology offers a reliable substitute for the fallible clinician!

Conflict of interest

None declared.

Pierpaolo Pellicori
Research Fellow in Cardiology
(pierpaolo.pellicori@hey.nhs.uk)

Andrew L Clark
Chair of Clinical Cardiology and Honorary Consultant Cardiologist

Department of Cardiology, Hull York Medical School, Hull and East Yorkshire Medical Research and Teaching Centre, Castle Hill Hospital, Cottingham, Kingston upon Hull, HU16 5JQ

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Improving ECG competence and confidence: a local DGH perspective

Dear Sirs,

I read with interest the article by Rowlands and Moore[1] and the current variability in the competence among healthcare professionals including experienced clinicians interpreting electrocardiograms (ECGs). The fundamental point is raised about the patient safety risk that occurs across the National Health Service (NHS). A previous retrospective analysis of 1,000 single-centre emergency department cases and ECGs found that 38 patients had been discharged with 'abnormalities that could potentially alter case management'.[2] The route of variability in competence of ECG interpretation for doctors can be traced back to undergraduate and postgraduate training. Over the last two decades, there has been a seismic shift in the pattern of training both at medical school and as a junior doctor. Medical school curriculums have altered, with many having less taught time for procedural skills and relying more on clinical attachments. However, there is less time available to teach medical students clinical skills.[3] Postgraduate training programmes vary in size and quality between locations of foundation programme rotations. This manifests in the lack of confidence and competence in clinical skill performance, which we have particularly noticed in ECG interpretation. The UK is attempting to provide a standardisation for competency in ECG interpretation for doctors in training. The Foundation Curriculum 2010 (updated 2012) outlines ECG diagnoses and features that should be recognised and correctly interpreted in the foundation year one (FY1) role.[4] Despite this standardisation, there continues to be variation. We have demonstrated this variation in a small, prospective, randomised study examining confidence and competence in ECG interpretation in undergraduates and postgraduates.[5]

We hypothesised that undergraduates and postgraduates would have variable confidence and competence in ECG interpretation due to varying experiences in learning, and this could be improved by offering specific training sessions to their training level. We randomised 26 FY1 doctors and 36 third-year medical students (volunteers) to a group undertaking focused training sessions (FTP) or self-directed learning (SDL). The FTP instructor was blinded to randomisation. FY1 and third-year medical students had separate, tailored training sessions. Confidence and competence was evaluated using a questionnaire (before and after) and a multiple-choice questionnaire (set by two independent consultant cardiologists). Baseline confidence rating was variable within each group. The most concerning rating for confidence in FY1 doctors was 'poor' (19.1%) with the most common rating being 'satisfactory' (66.6%). The third-year medical students most frequently rated themselves as 'very poor' (60%). The baseline confidence evaluations were particularly concerning for the FY1 doctors, though there is an improvement for both groups after the learning intervention, especially for those that underwent FTP. Following both learning interventions, confidence improved for all volunteers, with the greatest improvement in both FTP groups. Confidence was rated for interpreting specific individual ECGs. Baseline confidence for third-year medical students was poor for all ECGs except 'sinus rhythm'. FY1 doctors at baseline did rate themselves as more confident interpreting life-threatening ECGs (ventricular fibrillation and tachycardia), but frequently rated themselves poorly for left and right bundle branch block. Third-year medical students more frequently rated themselves as confident in interpreting all the specific ECGs on the questionnaire. There was an improvement in confidence for both FY1 groups, without there being a clear difference between FTP and SDL. Confidence in 'bundle branch block' interpretation remained low, despite intervention in both groups. For individual ECG interpretation competence there were no statistically significant differences between each FY1 group. The third-year medical students in the FTP group interpreted 'ventricular tachycardia' ($p=0.046$) and 'narrow complex tachycardia' ($p=0.009$) significantly better than their SDL counterparts.

Rowlands and Moore hit the nail on the head highlighting the variability in correct ECG interpretation. This is a problem that has its foundations in the learning to become competent. Many stratagems may help to improve competence, however, a focused teaching programme, as highlighted in this article, can be very effective. Our study was cost-neutral and the results demonstrated an improvement in confidence in both groups and competence in the third-year medical students. Our study was performed on small numbers, but highlights the current problem and one strategy that should be considered to improve the situation.

Conflict of interest

None declared.

Christopher McAloon, Speciality Registrar in Cardiology (christopher.mcaloon@doctors.org.uk)

Helen Leach, Foundation Year One Doctor

Simrat Gill, Core Medical Trainee

Jasper Trevelyan, Consultant Cardiologist

Worcestershire Acute NHS Trust, Charles Hastings Way, Worcester, WR5 1DD

Arun Aluwalia, Specialty Registrar in Public Health

Birmingham Heartlands Hospital NHS Trust, Bordesley Green, Birmingham, B9 5SS

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