Update in Anaesthesia

From the journals

Pratheeban Nambyiah
Correspondence email: pnambyiah@doctors.net.uk

Push, blow or both: is there a role for compression-only CPR?

Nolan J. *Anaesthesia* 2010; **65**: 771-4

New cardiopulmonary resuscitation guidelines were published in October 2010. One current debate concerns the necessity of ventilation of the lungs during cardiopulmonary resuscitation (CPR). There is a lack of good evidence regarding CPR and most recommendations are drawn from expert opinion and non-randomised studies. The necessity to perform mouth-to-mouth ventilation may deter bystanders from attempting CPR, particularly in areas where the prevalence of blood-borne diseases is high. The bystander CPR rate in England for 2004-2006 was 36%, and on the basis that 'any CPR is better than none', there are calls from some experts for compression-only CPR to be incorporated into international guidelines.

The rationale is that it may increase bystander CPR rates, decrease the 'no-flow' time created when chest compressions are interrupted to give mouth-to-mouth ventilation, and is easier to teach. In support of this, a meta-analysis published after this editorial supports the benefit on outcome with chest-compression-only resuscitation compared to conventional CPR.[1]

However those with asphyxial cardiac arrest, particularly children or drowning victims, are likely to require early ventilation.

Findings from a Japanese observational study of cardiac arrest in children suggest that 71% are from non-cardiac causes, and that within this sub-group conventional CPR produces better neurological outcome.

Given that any teaching would have to cover CPR for this vulnerable group, it would be difficult to advocate that all bystander CPR should be compression-only. This editorial therefore advocates 2-stage teaching for the lay public: a basic compression-only CPR course that could be easily taught to most of the community, followed by more advanced follow-up training in conventional CPR.

Reference

Hüpfl M, Selig HF, Nagele P. Chest-compression-only versus standard cardiopulmonary resuscitation: a meta-analysis. *Lancet* 2010; **376**: 152-7.

Umbilical vein oxytocin for the treatment of retained placenta (Release Study).

Weeks A et al. *The Lancet* 2010; **375**: 141-7

Retained placenta is a major risk factor for post-partum haemorrhage (PPH) and sepsis. It complicates 0.1-2% of deliveries and, in settings where there is restricted availability of surgical and anaesthetic facilities, has a case fatality rate of nearly 10%.

As such a low-cost, effective non-surgical intervention is urgently needed. Recent WHO guidelines on the management of PPH have suggested that umbilical oxytocin 'may be offered'. The theory is that delivery of oxytocin directly to the retroplacental myometrium via the umbilical vein promotes muscular contraction and causes the placenta to shear off. The WHO recommendation is largely based on a 2001 Cochrane meta-analysis which suggested some benefit, albeit with reservations.

This multicentre randomized controlled trial breaks new ground, both in its quality (577 women were randomly assigned to treatment oxytocin or placebo saline, at three centres in Uganda, Pakistan and the UK, in a double-blind trial, analysed by intention to treat, with no participants lost to follow-up) and for the fact that the oxytocin is delivered via an umbilical vein catheter, rather than as an injection into the umbilical vein, which is thought to increase the

Pratheeban Nambyiah
Specialist Trainee
Anglia School of Anaesthesia
UK

concentration of oxytocin reaching the placental bed. Unfortunately the study, which was adequately powered to detect a 20% relative reduction in the need for manual removal of retained placenta, failed to detect a difference between the two groups (oxytocin 179/262 [61.3%] vs placebo 177/285 [62.1%] RR 0.98, 95% CI 0.87-1.12, P=0.84). The authors also revisited the Cochrane meta-analysis, and found that when their study is added to the review, there is no evidence of benefit with oxytocin. There was no evidence of harm, but they argue that "in busy, resource-poor setting, clinicians' time… can be better used elsewhere".

The reason for the lack of efficacy is not clear, but it may be that the oxytocin enters retroplacental lakes from where it drains into the uterine vein without entering the capillaries feeding the myometrium.

Intraoperative risk factors for acute respiratory distress syndrome in critically ill patients.

Hughes C, Weavind L, Banerjee A, Mercaldo N, Schildcrout J, Pandharipande P. *Anesthesia & Analgesia* 2010; **111**: 464-7

Some models for the development of acute respiratory distress syndrome (ARDS) propose a 'two hit' hypothesis, whereby the first insult leads to tissue injury and inflammation, and the second to the clinical features of ARDS. This retrospective cohort study looks at potential intraoperative risk factors that could act as the 'first hit', predisposing patients to developing ARDS in their subsequent clinical course. 89 surgical patients who required postoperative mechanical ventilation were assessed for the development of ARDS (according to ARDSNet diagnostic parameters) in the first seven postoperative days. The authors hypothesized that the intraoperative use of aggressive fluid resuscitation, high tidal volume per ideal body weight (TV/IBW) ventilation, and transfusion of blood products would be independent risk factors for the subsequent development of ARDS.

They found that, for patients given 20ml.kg^{-1} fluid, the unadjusted odds for developing ARDS were 3.1 times that of patients given <10ml.kg^{-1}. Adjusting for confounders using propensity scoring (including APACHE score and presence of sepsis) strengthens the association (odds ratio 3.8, P=0.04). A lower magnitude of increased risk is seen for patients receiving 10-20ml.kg^{-1} of fluid (OR 2.4) but this was not statistically significant (P=0.14). However, the results did not support their other two hypotheses, namely the importance of high TV/IBW and transfusion of blood products intraoperatively, although these are recognized risk factors for ARDS in other settings.

There are limitations to the study – for example its retrospective design, its focus only on those patients who required mechanical ventilation postoperatively, the lack of differentiation between different types of fluid and blood products, and the absence of information about intraoperative haemodynamic status (for example, what role does intraoperative hypotension play?). However at a minimum this study has focused attention on an area that deserves further prospective analysis.

Hospital–acquired infections due to gram negative bacteria

Peleg A, Hooper D. *New England Journal of Medicine* 2010; **362**: 1804-13

Making generalized comments on microbiology topics is always difficult, as the range of pathology, local microbial flora, and antimicrobial sensitivity profiles vary across the globe. However, this review makes a number of educational points which make it useful reading. Gram negative bacteria have a number of mechanisms facilitating resistance to antimicrobial agents. This has been compounded by the fact that recently there have been few new agents in production, due to a combination of financial and technical difficulties. As a consequence we now have increasing drug resistance in the absence of drug development.

Gram negative infections in hospital lead to three main classes of infection: lower respiratory tract, blood stream and urinary tract. Urinary tract infections are the most common, but the others are the most lethal. The majority of pneumonias in this setting are associated with mechanical ventilation. The organisms most often responsible are *Pseudomonas, Acinetobacter, and Enterobacteria*. Of particular concern in some areas of the world (for example Greece) there is now growing resistance of ICU isolates to carbapenems such as imipenem and meropenem. More recently, the concept of health-care associated pneumonias has been developed. These affect patients who have extended contact with health-care facilities or treatment in the community; they are more likely to develop gram negative and multi-drug resistant pneumonias, and should not therefore be treated as other community-acquired pneumonias.

Blood stream infections are usually associated with invasive medical devices or surgery. Almost any gram negative organism may be responsible given an adequate portal of entry, but those among the most common include *Klebsiella, E.coli, enterobacter, and Pseudomonas aeruginosa*. Again, extended spectrum β-lactamase producing bacteria (ESBLs) are proving to be resistant to carbapenems (particularly in South America and China), and often also carry fluroquinolone resistance. The authors emphasise that diagnosis and treatment should be based on surveillance of local flora. However strategies should include early empirical treatment with broad-spectrum antibiotics in those most at risk, followed by de-escalation to narrow-spectrum agents based on culture and sensitivity profiles. The use of 'care bundles' is encouraged to reduce ventilator-associated and central venous catheter-related infections.

Anaemia and patient management in hip and knee surgery. A systematic review of the literature.

Spahn D. *Anaesthesiology* 2010; **113**: 482-95

Issues surrounding transfusion of allogenic blood products have had a high profile recently. This systematic review looks at pre- and postoperative anaemia in orthopaedic surgery, and the effects on clinical outcomes. 49 relevant publications were retrieved from a Medline search, each with a sample size of greater than 100 patients. (A further 65 publications reporting on less than 100 patients were also used to fill possible evidence gaps.)

The major conclusions were as follows:

- Most studies report impaired functional mobility in the early postoperative period in the presence of anaemia, although not all reach statistical significance.
- There is an increased incidence of postoperative urinary tract and respiratory tract infections in patients with preoperative anaemia.
- Several prospective cohort studies show a significantly increased length of hospital stay (LOS) and mortality in the anaemic groups.
- The use of perioperative iron supplementation, recombinant human erythropoietin, and cell salvage reduces the need for allogenic blood transfusion (ABT). Some studies also show reduced postoperative infection rates, LOS, and 30-day mortality although these latter outcomes do not always reach statistical significance.
- Use of conservative transfusion algorithms (e.g. triggered at Hb $<7 g.dl^{-1}$ rather than $<10 g.dl^{-1}$) reduces the need for ABT (without increasing LOS in the one study that reported clinical outcomes).

There are some weaknesses acknowledged in this review. The definition of anaemia in the constituent studies varies from a haemoglobin level less than 13 to less than $8 g.dl^{-1}$, and is sometimes not reported at all. Similarly transfusion triggers varied and were inconsistently reported. Many of the studies are underpowered to detect differences in endpoints such as physical functioning, LOS and mortality.

Importantly, the question arises as to whether it is preoperative anaemia or the parallel increase in perioperative ABT that is responsible for the adverse outcomes. Studies in cardiac and general surgery have found that both are independent risk factors for postoperative mortality, ischaemia, and infections, and there is no reason to suppose that orthopaedic surgery would be any different. This review therefore adds to the growing body of evidence that suggests that although anaemia is a serious problem in this cohort of patients, strategies to minimise ABT are likely to be of patient benefit.

Two other pertinent studies have entered the literature since this review was published. In a large case-control study at the Mayo Clinic, Mantilla et al. looked at the risk of peri-operative myocardial infarction and mortality in patients undergoing hip or knee arthroplasty. The authors concluded that anaemia per se is not independently associated with MI and mortality in these patients; rather that pre-existing comorbidities are. Glance et al. conducted a retrospective analysis of over 10,000 patients, and found that intra-operative transfusion of just 1-2 units of erythrocytes in the setting of elective surgery is associated with higher mortality and morbidity in patients with anaemia, although it is impossible to be certain whether this is due to the transfusion, or to the surgical blood loss. For different reasons then, both these studies suggest we should be more conservative with our transfusion strategies.

The multi-centre FOCUS trial, designed to compare an aggressive transfusion strategy with a conservative one, may provide a more complete answer. Full publication is awaited, but results published in abstract form suggest that there is no difference in mortality or functional outcomes between conservative and liberal transfusion triggers.

Further reading

Mantilla et al. Risk for perioperative myocardial infarction and mortality in patients undergoing hip or knee arthroplasty: the role of anemia. *Transfusion* 2011; **51**: 82-91.

Glance et al. Association between intraoperative blood transfusion and mortality and morbidity in patients undergoing noncardiac surgery. *Anaesthesiology* 2011; **114**: 283-92.

Carson JL, Terrin ML, Magaziner J, Chaitman BR, Apple FS, Heck DA, Sanders D. Transfusion trigger trial for functional outcomes in cardiovascular patients undergoing surgical hip fracture repair (FOCUS). *Transfusion* 2006; **46**: 2192–206.

Anaesthetists' non-technical skills

Flin R, Patey R, Glavin R, Maran N. *British Journal of Anaesthesia* 2010; **105**: 38-44

Recently individual tragedies have focused attention on the role that human factors play in the breakdown of safe practice in anaesthesia.

One such case was that of Elaine Bromiley, who died after a failure to recognise and manage a 'can't intubate, can't ventilate' scenario. Her husband is a pilot, and the record of the aviation industry in placing human factors at the centre of safety management contrasts with our somewhat technically-focused discipline.

This issue of the BJA is dedicated to examining the role of human factors in anaesthesia and critical care.

The anaesthetist's non-technical skills (ANTS) system is reviewed in the above article. This is a tool to aid teaching, appraisal and research. It has four categories: situational awareness, decision-making, task management, and team working. Each category has component elements and examples of good and bad behaviour. For instance, behavioural markers of good practice in team working may include discussing cases with surgical colleagues, whereas markers of poor practice in situational awareness may include easy distractibility and fixation. The increased use of high-fidelity simulators in recent years provides an important opportunity to explore these skill sets.