therefore, it is difficult to compare the results from different hospitals. This is an important point. Despite using a range of concentration of ADP activator for LTA in their study (2–5 μM), when analysing agreement between LTA and modified thrombelastography (mTEG), a concentration of 5 μM was used. Chen and colleagues used a concentration of 2 μM again, extrapolating predictive values for bleeding between the two papers, in our opinion, requires caution.

Agarwal and colleagues demonstrated good agreement between LTA and mTEG in patients on clopidogrel therapy, κ 0.81, with agreement in 14 of 20 patients. In 10 patients identified as having a definitive response to clopidogrel by LTA, seven patients were also identified by mTEG. However, conversely, three patients were false negatives. In patients taking both clopidogrel and aspirin, mTEG correctly identified only five out of 10 patients, a 50% false negative rate. Therefore, if mTEG was used alone, a proportion of patients would have been cleared for surgery and anaesthesia, despite having definitive ADP receptor platelet inhibition.

Perhaps most importantly in our paper, the finding of a wide range of both platelet ADP and TxA2 receptor inhibition in the control group remains unexplained. The issue concerning the concentration of platelet receptor agonists has been discussed. The potential for a high false-positive rate is therefore of concern and, as we highlighted, requires further investigation.

Finally, we are equally excited about the potential point of care tests of platelet function. There is huge potential for tailoring the timing of surgery, informing the use of neuroaxial anaesthesia, guiding blood product transfusions, and identifying at-risk non-responders to antiplatelet agents. However, as we conclude, more work is required with TEG® platelet mapping™ before truly evidence-based guidance can be offered.

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Preoperative percutaneous patent foramen ovale closure before neurosurgery in the sitting position

Editor—We wish to congratulate Dr Fathi and colleagues on their systematic review of air embolism associated with neurosurgery in the sitting position and patent foramen ovale (PFO) closure. Percutaneous PFO closure can be performed relatively easily with excellent results in a specialist high-volume centre such as ours, where 524 percutaneous atrial septal closures have been performed since 1994 with a major complication rate is 0.19% and no deaths. Results of a recent audit demonstrated that 94% of patients were highly satisfied with their care. We perform percutaneous atrial septal closure under general anaesthesia with intraoperative transoesophageal echocardiographic and fluoroscopic guidance. This procedure has been routinely performed as a day case in our centre since 2006.

We agree with the authors that preoperative percutaneous PFO closure should be considered before neurosurgery in the sitting position. However, the advantages of the sitting vs the horizontal operative position need to be clarified before exposing patients to the small but definite risk of an additional procedure. Although the incidence of venous air embolism is higher in the sitting compared with the horizontal position, there appears to be less need for blood transfusion and improved facial nerve function after neurosurgery in the sitting position. If neurosurgeons, neuroanaesthetists, and patients believe that the advantages of the sitting operative position outweigh the modest risk of percutaneous PFO closure, then we would be prepared to close PFOs for this indication.

It should be remembered that, regardless of position, paradoxical air embolism across a PFO may occur during neurosurgical procedures. Paradoxical air embolism may be associated with events during induction of or emergence from anaesthesia. The Valsalva manoeuvre is known to transiently increase right atrial pressure, so that it exceeds left atrial pressure, but coughing, breath-holding, straining, or struggling may have a similar effect.

We suggest that all patients undergoing elective neurosurgery in the sitting position should be screened for PFO and considered for percutaneous closure. This strategy will permit safer surgery to be performed in the most appropriate position.

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Editor—We are obliged to Dr Webb and colleagues whose comments support our article on percutaneous PFO closure before neurosurgery in the sitting position. We have nothing to add other than that the benefit of PFO closure is not limited to the day of neurosurgery. In fact, it persists for the rest of the patient’s life and potentially protects against subsequent paradoxical stroke, myocardial infarction, or other systemic embolism. In addition, patients with PFO often suffer from migraine, independent of the problem requiring neurosurgery, and migraine symptoms may improve.

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Hyperbaric oxygen therapy for arterial gas embolism

Editor—The June issue of the British Journal of Anaesthesia contained three informative articles discussing various aspects of gas embolism.1–3 In their report of paradoxical air embolus from a central venous catheter, Eichhorn and colleagues2 incorrectly state that ‘no specific treatment is available’ for the management of arterial gas embolism (AGE). Hyperbaric oxygen therapy (HBOT) has been an established treatment for both diving-related and iatrogenic AGE for many years. Although there are no randomized controlled trials demonstrating the positive effect of HBOT, there are numerous case reports and case series and also sound mechanistic principles that support its use in AGE.4,5 The high oxygen tension promotes the resorption of nitrogen from the bubble and the elevated ambient pressure reduces the size of the bubbles in accordance with Boyle’s law. At 282 kPa (a conventional HBOT treatment pressure), spherical gas bubble diameter will be reduced to 82% with a resulting 45% decrease in volume, such that bubble passage through the microcirculation and resolution of embolic phenomena may occur. In their review of 27 case series, Moon and Gorman6 report substantial improvement in outcome in patients with AGE treated with HBOT. Three hundred and forty-six (78%) of the 441 who received HBOT fully recovered and 20 (4.5%) died. Of the 288 with no recompression therapy, 74 (26%) fully recovered and 151 (52%) died. We feel it is incumbent upon clinicians anaesthetizing patients at risk of AGE (such as those undergoing neurosurgery in the sitting position) to be aware of what, if any, services are available for the administration of HBOT should this complication occur. There are obvious limitations to HBOT, including the location of chambers (necessitating the transfer of critically ill patients) and the ability of those chambers to care for critically ill patients during the therapy. However, if facilities are available, HBOT should be considered immediately in cases of iatrogenic AGE as early treatment may improve outcome.4

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Editor—We thank Dr Edsell and Kirk-Bayley for their constructive comments on our manuscript. We do not doubt that an HBOT therapy may be useful in patients with acute AGE. The mechanism of reducing the size of the air bubbles by an elevated ambient pressure in a pressure chamber is clearly described. The resorption of nitrogen from the bubbles by high oxygen tension is also beneficial. These mechanisms are indubitably helpful in the case of an AGE. However, our hospital, which is close to the North and Baltic Seas, and therefore involved in the management of nautical accidents, is 100 km away from the nearest pressure chamber with 24 h availability. We still believe that for a sudden AGE, the time from the (often late) diagnosis to an HBOT treatment is unacceptably long and not reasonable. This is further stressed by avoidance of air transportation which makes the transport longer and more complicated as well. For the reasons mentioned above, we still believe that there is no reasonable specific treatment for an AGE in a typical clinical scenario where the AGE emergency is unexpected. For high-risk operations, like the sitting position in neurosurgery, it would be helpful to have the algorithm for AGE management including the possible decompression in a pressure chamber available.

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