Fourth step for ultrasound-guided central vein catheterization

Editor—We read with great interest the article by Tokumine and colleagues.1 The authors have introduced and demonstrated the safest method for central venous catheterization under real-time ultrasound guidance using the long-axis view of the vessel with the in-plane needle approach. As they have pointed out, the ultrasound-guided procedure with the short-axis view of the vessel with the out-of-plane needle approach would increase the success rate of venous puncture, although the technique will never be able to prevent unintentional penetration of other vital structures, including the carotid artery and pleura.2 Strictly executing the three-step method, our anaesthesiologists could accomplish safe and practical catheterization.

Longitudinal ultrasound imaging is the most essential and important factor. Interestingly, the pictures demonstrated by the authors’1 were very similar to our presentations.3 The National Institute for Clinical Excellence (NICE) guidelines of 2002 (reviewed in 2005)4 5 recommend ultrasound guidance for central venous cannulations; however, the detailed practical description including the axis of ultrasound is not found in the text. When physicians endeavour to establish the safest methods for central venous catheterization, many practitioners would reach a similar conclusion,6 7 that is, the long-axis, in-line real-time ultrasound guidance technique.

The three-step method could be considered to be an almost perfect way and there might be no room for discussion. However, we would like to append a fourth step. In our intensive care unit, the supervisor requires the operator to confirm appropriate i.v. guidewire placement by ultrasound examination before the insertion of a large-bore dilator and catheter. The intensivists track the guidewire as far as is possible to the limits of ultrasound visibility. The ultrasound probe is placed on a supraclavicular fossa, and when the internal jugular vein is accessed, we usually confirm the correct placement at the level of branching of the jugular vein and subclavian vein. The detection of the guidewire in the jugular vein near the entry site is never a guarantee for an appropriate placement.1 2 The penetration of the posterior wall of the internal jugular vein and other vital structures can occur at a site more proximal than the skin puncture.

Thus, extensive tracking of the guidewire before the large-bore cannulation is recommended as the fourth step of the method introduced by Tokumine and colleagues.1 We have no results of clinical investigation on this improvement so further study is required.

Declaration of interest

None declared.

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Reply from the authors

Editor—We appreciate the constructive comments of Dr Adachi and colleagues, and would like to further explain our message. While we greatly appreciate their kind remarks, we also acknowledge that the long-axis in-plane ultrasound guidance technique itself is not perfect. The long-axis in-plane technique also may lead to inadvertent anterior to lateral double-wall punctures.1 This technique is restricted by the use of two-dimensional views. Dr Adachi and colleagues demonstrated the possibility of an anterior to posterior double-wall puncture with the long-axis in-plane technique in clinical settings, such as hypovolaemia.2

We agree that the passage of the guidewire can be a significant cause of difficulties. To prevent it, confirming appropriate i.v. position of the guidewire using ultrasound observation is effective, as recommended by Dr Adachi and colleagues. The technique they describe (‘The fourth step’) may increase the rate of appropriate positioning of the guidewire, and we agree that further study is indicated.

During each step of the placement process, guidewire coiling in the vein, migration into a small vein branch, tear or injury of the vein during dilation, or incorrect position of the catheter tip may occur. We would add that fluoroscopy might also be useful.3 4 The combination of ultrasound and fluoroscopy may be ideal, but not always feasible due to the condition of the patient. In many situations, Dr Adachi and
Declaration of interest

J.T. is a technical adviser of the Nippon Covidien Co. (Japan) and has done an ultrasound-guided technical training course held by the company.

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Human factors view of preoperative assessment

Editor—Painter and Ludbrook’s letter in the BJA raises some interesting points with regard to patient safety. As it happens, preoperative assessment was one of the anaesthetic activities that my colleagues and I examined in a recent research project. Here, I will share a few thoughts on the issues raised by Painter and Ludbrook in the light of our and others’ findings.

As suggested in their letter, preoperative assessment can be a complex activity due to the amount of data that the anaesthetist has to assimilate and interpret. Often, some of the data need to be gleaned from other members of staff or from the patients themselves; this relies on the anaesthetist having access to, and communication with, those that have the relevant knowledge. A multidisciplinary preoperative clinic such as that in Painter and Ludbrook’s hospital is one solution, as it provides an ideal opportunity for the different parties involved in a case to share their knowledge about it. Alternatively (or additionally), some form of preoperative planning aid could be used to collate and present information for the anaesthetist. This might, for example, pull data from relevant sources (such as the electronic patient record, surgical or ward records, and patient self-assessment), highlight key indicators and discrepancies within the data, and suggest implications for the case at hand. The design of such an aid would be informed by analysis of the information exchanges and decisions that take place during the anaesthetist’s assessment.

There is, though, another angle on preoperative assessments to consider: we found that anaesthetists’ decisions to carry out an assessment were influenced by a range of attitudinal factors. The two most influential factors were the perceived outcomes of carrying out the assessment (e.g. risk reduction vs inconvenience) and the extent to which the anaesthetist feels that it is within his or her power to decide (in the face of, for example, time pressure and the patient’s risk classification). It seems that anaesthetists’ engagement in assessments is, in part at least, a product of the situations they encounter and their beliefs and experiences with regard to assessments. I should point out that we defined an assessment as a visit to the patient before the list starts—but would it ever suffice to just ask a few questions in the theatre immediately before the anaesthetic? I will leave that for the BJA readership to debate.

In principle, there are indeed benefits to using a preoperative checklist; it can help to ensure appropriate gathering and use of data for preoperative planning. Furthermore, a checklist can be used to coordinate the activity of all those who contribute to the planning, especially when working under pressure. However, it is important that the checklist design is informed by the circumstances under which it will be deployed, and ideally those who are to use the checklist in practice should be involved in its design and implementation. There is, in addition, the question of whether changes should be made to the circumstances themselves. For example, if it is not possible to bring patients into an assessment clinic before the day of the operation, then efforts might be made to streamline the process of patient admission and transfer on the day, in order to prevent the anaesthetist having to make up for delays, inefficiencies, or miscommunications in the course of the preoperative assessment.

Painter and Ludbrook have put forward some valuable suggestions about ways to improve the preoperative assessment. The studies discussed here concur with their views, but also suggest other issues that those who share their concerns may wish to consider.

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