Pro/Con—Ultrasound and central access—Is it time to enforce a standard of care?

Con

E Hessel

(University of Kentucky, Lexington; ehessel@uky.edu)

The data are fairly convincing that based upon multiple randomized controlled trials (RCT) use of ultrasound (US) guidance as compared with Landmark technique (LT) for central venous cannulation (CVC) of the internal jugular vein (IJV) is more effective in terms of all outcomes including faster placement, fewer attempts, fewer failures on first attempt, and reduction of complications including arterial puncture, pneumothorax, hematoma, and hemothorax. But should this translate to promulgating this as a standard-of-care (Feller-Kopman 2005) as has the English National Institute for Clinical Excellence (NICE) (2002)? I believe not. These regulatory agencies have good intentions but they are not always right.

Despite promulgation of the NICE guidelines, surveys have found that adoption of this practice has been low (15, 26, 27% and 39%) among pediatric and cardiovascular anesthesiologists and anesthesiologist in other specialties in the USA and Great Britain (Bosman 2006, Tovey 2007, Bailey 2007, McGrattan 2008). Why is this? Partly it relates to “lack of apparent need” (40%), and lack of availability of the equipment, but there are other limitations which I will expand upon:

1. Inhibits trainee education. I believe the greatest hazard of adopting a policy that exclusively utilizes ultrasound is that practitioners will lose their skills (or never gain them in the case of new trainees) at successful and safe central venous cannulation without ultrasound when such skill is called upon [e.g., emergent situations, when equipment fails or is unavailable, and when it is not easy to utilize ultrasound (e.g. “under the drapes”, etc)].

2. The benefits of US guidance are less demonstrable in experienced clinicians (Wigmore 2007, Keenan 2002, Gualtieri 1995) which reinforces my concern # 1.

3. Clinicians will increase their reliance on technology and neglect anatomic knowledge and clinical skills.

4. A major limitation of most studies is the landmark technique (LT) employed. Most landmark techniques that are described in text books and articles are based upon prediction/approximation
of location of the internal jugular vein (IJV) but not on definitive anatomic relationships. The
only anatomically valid landmark for the IJV is the carotid artery since the IJV resides within the
carotid sheath. Therefore one should use accurate identification of location of the carotid artery
(by palpating from the front not the side) as the optimal landmark technique (which I have used
for 25 years and have found to be invariably reliable as assessed by two-dimensional ultrasound
in the past few years).

5. Exposure to medical-legal risk if not used: Liability lawyers embrace standards-of-care. They
increase the liability of practitioners even when there is a legitimate reason for not using US.

6. In the 80-90% of cases where the IJV can be successfully cannulated without complication on the
first attempt by experienced clinicians using landmark technique (LT) the latter is faster and
cheaper.

7. Increases cost (equipment, billing, and personnel) which may or may not be balanced by reduced
cost of complications (Kinsella 2008).

8. Many advocate a two person technique or assistance of a technician when US is employed, which
is a drain on manpower and is also costly.

9. Use of US does not eliminate complications, especially when learning. I have witnessed a number
of arterial punctures while US was being utilized.

10. Requires an educational system, time and experience to learn.

11. Possible increase risk of infection.

12. Not all US devices are equally effective or easy to use or interpret.

These criticisms do not mean I don’t advocate teaching and use of the ultrasound technique. I do use
it and teach it. It is useful in teaching anatomy (reinforcing the reliability of use of carotid artery to
identify the location of the IJV) and as a rescue technique when the LT has failed, when anatomy or
hypotension makes it hard to identify the carotid artery, and in patients who have had multiple previous
IJ lines or history of failed attempts. It is just not wise to promulgate it as a standard of care and require
that it be used in all or even most placements of central venous lines.

Bibliography


3. Bosman M and Kavanagh RH. Two dimensional ultrasound guidance in central venous catheter


