

# CVL complications

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There are only a few events in anaesthesia practice where anaesthetists can cause severe harm, and even mortality, within minutes. They include failure to manage a difficult airway, malignant hyperthermia, severe anaphylaxis, and various sequelae due to placement of neuraxial local anaesthetic agents in the wrong place. There has been a great deal of welcome effort involved in teaching about and research into how we can manage these situations better in the future.

Another procedure we often do, namely CVL placement, also has the potential to cause severe complications, including death. It is the authors' view that it's time to evaluate what we can do better with this procedure. This presentation will mainly concentrate on insertion of a CVL into the internal jugular vein.

Initially we will present clinical cases, so today this is a closed meeting with a requirement of complete confidentiality, as you would have for any morbidity review.

Then we will review the evidence, including a particular publication that allows us to calculate a rough estimate of how many serious CVL insertion complications might be happening annually in NZ.

Following this there will be an outline of the recommended safety improvements that should be used to insert CVLs without causing complications. This outline is based to a large extent on the ASA(USA) most recent published guidelines and where relevant, other literature will be presented. In particular, the absolute need to use real time ultrasound during the procedure and the requirement to make sure the Seldinger wire is in the central vein before vessel dilation will be reinforced. Those of you who currently do not insert and then transduce a cannula which has been hopefully inserted into the jugular vein should at least start to learn how to do this, whether for every case (perfect) or when teaching junior staff what to do, or whenever there is any question of where the wire has gone.

The next item we will outline (beyond what the ASA recommends) is a suitable literature package which all SMOs and RMOs should read to be up to date on this topic. This arguably should be part of any improvement process which covers CVL insertion. Additionally, we will list several contexts where SMO staff should be actively involved in the insertion of a CVL. The days of handing off any predicted difficult CVL insertion to an RMO working on their own should be gone.

At the end of the presentation, you should be aware of the current state of CVL complications in NZ, a plan for how to improve your CVL insertion technique if you think you need to, a literature base for you and trainees to use and some idea of cases which need obligatory SMO active involvement. Then it's over to you.

## **Take Home Points:**

#1. From combining UK data about the frequency of CVL insertion along with a recent Swedish study (the biggest study so far) which documents the serious complication rate, we can say that NZ might be having as many as 74 serious complications per year from CVL insertion.

#2. The data are clear that using real time US is a major help in reducing these complications, but that US use alone *does not eliminate* serious complications.

#3. Relying on the absence of pulsatility and/or red colour to determine unintentional arterial needle placement is falsely reassuring, as 20% of the time you will miss that the needle is accidentally in an artery.

#4. In more than 10,000 cases reported using pressure transduction to confirm whether or not the cannula or needle was in an artery, no arteries were accidentally dilated.

#5. Using US to confirm correct wire placement before dilation has been found to be helpful but we have documented cases where this has been falsely reassuring and arterial dilatation has occurred despite believing the wire was in a vein.

**Bottom line.... Current practice in NZ is still causing CVL insertion complications and the literature suggest that much of this harm is preventable.**

#### **Resources**

1. Practice Guidelines for central Venous Access 2020. Anesthesiology Jan 2020;132:8-43. Tung et al
2. Mechanical complications after central venous catheterisation in the ultrasound-guided era: a prospective multicentre cohort study. BJA 129(6)843-850(2022). Adrian et al
3. Eliminating Arterial Injury During Central Venous Catheterization Using Manometry Anesth Analg 2009;109:130-4. Ezaru et al
4. Vascular complications of central venous catheter placement: evidence-based methods for prevention and treatment. J Cardioth Vasc Anesth 2014, April (2)358-68. Bowdle
5. Preventing vascular damage during central venous catheter insertion via the internal jugular vein. Australasian Anaesthesia 2019 .p 75-88. Bath
6. Arterial trauma during central venous catheter insertion:Case series,review and proposed algorithm. J Vasc Surg 2008;48:918-25. Guilbert et al.