Letters to Editor

Iatrogenic catheterisation of subclavian artery while cannulating internal jugular vein

Sir,

Placement of a central venous catheter (CVC) carries a complication rate of 17.9%.\(^1\) Use of ultrasound guidance has been advocated as standard of care to reduce complications and achieve higher success rate.\(^2\)\(^-\)\(^4\) However, ultrasound-guided cannulation does not altogether negate accidental arterial puncture as has been found in our patient.

A 3-year-old female child weighing 16.9 kg and having a midline brain stem tumour with hydrocephalus was posted for elective tumour excision. Following uneventful tracheal intubation and maintenance of anaesthesia with 50% oxygen in air, 1.5% sevoflurane and remifentanil (0.25 µg/kg/min) infusion, it was decided to place an arterial line and a CVC.

Positive end expiratory pressure of 4-cmH\(_2\)O was now momentarily applied, which resulted in a well-dilated right internal jugular vein (IJV) on imaging using linear probe of Mindray ultrasound machine (Shenzhen Mindray Bio-medical Electronics co. Ltd., Zhenzhen 518057, P.R. China). Right IJV was punctured at first attempt by a 4th-year anaesthesia resident with the needle directed at a 45° angulation. After free aspiration of blood, a guide wire was passed through the needle uneventfully. Following dilatation of the cannulation site, a 5.5 Fr paediatric multi-lumen CVC with blue flex tip (Arrow International, Inc, 2400 Bernville Road, PA, USA) was passed. All three ports were checked for free aspiration of blood. The CVC was fixed at 8 cm mark and sterile transparent dressing was applied. At this stage, an intravenous line containing 5% dextrose in 0.45% normal saline was attached to the distal 20-gauge catheter port. Contrary to expectation, there was no flow of the fluid although blood could be freely aspirated from this port. However, a minimal spontaneous backflow of blood was noted in the infusion line. Despite changing to a different port, the infusion was not dripping. At this stage, doubt was raised that the line could be in an artery, and the transducer of the arterial line was connected to the CVC and an arterial waveform was noted. Before removing the catheter, ultrasound imaging was done to confirm the position of the catheter in the artery. As expected, the puncture site and IJV were significantly to the right of the carotid artery. Further scanning and change of probe angle revealed a pulsating vessel underneath the jugular vein, which could be the subclavian artery (SA). Surprisingly, the catheter was seen to pass through the internal jugular lumen and then to lie in the SA [Figure 1]. The CVC was now removed and compression for 5 min was applied. A fresh CVC was placed in the same IJV uneventfully.

We postulate a sequence of events that led to inadvertent SA puncture in our patient. The SA was about 2.5 mm deeper to the IJV as revealed by ultrasound [Figure 1].
The indentation of the wall of IJV while puncturing the vein or displacement of needle tip later after the probe was removed could be the reason for the needle tip entering the SA.

We suggest five key points to avoid this mistake while cannulating IJV in paediatric patients where the SA is only a few mm away. First, needle should be kept angulated in relation to skin, close to 30° instead of 45° during puncture as this tangential approach results in less application of posterior forces that tend to collapse the vein wall. Also, angulation helps where the IJV diameter is less than the longitudinal length of bevel of needle.\(^5\) Second, double wall puncture should be kept in mind where the vein diameter is small.\(^5\) Third, it is essential that the tip of the needle be constantly identified with ultrasound as it approaches the vein and puncture is made.\(^6\) Fourth, the path of guide wire should be confirmed by ultrasound prior to dilatation of the vessel. Lastly, a higher neck approach may be adopted in children so as to increase the distance between IJV and the SA, thereby reducing the possibility of its inadvertent puncture.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Nada RS Al Saadi, Aziz Haris\(^1\), Rashid M Khan\(^1\), Naresh Kaul\(^1\)

Oman Medical Speciality Board, Muscat, \(^1\)Department of Anaesthesia and ICU, Khoula Hospital, Muscat, Oman

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Address for correspondence:
Dr. Naresh Kaul,
Department of Anaesthesia and ICU, Khoula Hospital, Muscat, Oman.
E-mail: dmareshkaul@gmail.com

Submitted: 07-Nov-2021
Revised: 26-Dec-2021
Accepted: 28-Mar-2022
Published: 20-Apr-2022

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