

ACCIDENTAL TRACHEAL TUBE CUFF PUNCTURE DURING ATTEMPTED INTERNAL JUGULAR VEIN CANNULATION. CONCERNS AND RECOMMENDATIONS

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ABSTRACT

Accidental tracheal tube cuff puncture during attempted internal jugular vein cannulation. Concerns and recommendations

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Several techniques have been described for percutaneous internal jugular vein catheterization. Some of them are associated with complications, such as tracheal tube cuff puncture. We describe two cases of this rare but potential devastating complication, after which our patients recovered uneventfully. Despite these unfortunate accidents, we recommend the mentioned technique, but with some consideration. We propose measures concerning angles and directions of needles, as useful aids for further use of this cannulation technique.

Knowledge of alternative techniques for vein cannulation is undoubtedly invaluable. There have been reported 13 different approaches for percutaneous internal jugular catheterization[1]. Brinkman and Costley described in 1973 a high technique by lateral approach, where the needle aims the sternal notch[2]. We describe two cases of tracheal cuff puncture during an attempt of internal jugular vein catheterization with the mentioned technique and propose measures of preventing and avoiding this possible complication.

Case 1:

A 54-year-old female patient was admitted with severe hypotension and acute abdomen for an emergency exploratory laparotomy after abdominal hysterectomy three days ago. After induction with propofol and fentanyl, she was intubated with a No 8 orotracheal tube without difficulty. The cuff was inflated until no leak was heard. She was placed in 20⁰ Trendelenburg position and right internal jugular vein cannulation was attempted. Due to persistent hypotension (BP: 65/35 HR: 125/min) and inability to palpate carotid pulse, a lateral approach was used. There were three failed attempts with a 21G seeker needle, with the fourth being successful. Before proceeding with the 18G needle and the Seldinger technique, a drop in airway pressures was noted and noise from the patient's mouth was heard. Inflation of the cuff could not provide a seal, so the tracheal tube was replaced easily and a 1-mm puncture

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was confirmed. Right external jugular vein was cannulated without complications. The operation continued uneventfully.

Case 2:

In the intensive care unit, a 68-year-old female patient, in septic shock, intubated and mechanically ventilated, needed a change of central venous catheter. She previously had a left subclavian vein catheter, which was sent for culture. Despite inotropic support (nor-epinephrine 10 γ /min), her blood pressure remained low 75/45. Right internal jugular vein catheterization using the lateral approach, was attempted with a 21G seeker needle, successfully identifying the vein. While inserting the introducer needle, a resistance was felt along with a drop in ventilation pressures. A tracheal puncture was suspected and the patient was reintubated. The cuff was damaged with a 2-mm puncture. Chest X-ray showed no signs of pneumothorax or pneumomediastinum. A right subclavian vein catheter was inserted. There were no further complications from the catheterization.

DISCUSSION

Rare complications of internal jugular vein cannulation, such as tracheal or tracheal tube puncture, have been reported. In 1974, Blitt and Wright first reported the puncture of tracheal tube cuff after internal jugular vein cannulation[3], two cases documented by Konichezky et al[4] and one more recent by Malik and Adams[5]. All of the cases refer to the technique used as “posterior” approach, meaning that the approach begins from the posterior border of sternomastoid muscle. All of the above authors suggest avoiding this technique, because of the possible catastrophic consequences, which could have been occurred e.g. in a previous difficult intubation.

The technique proposed by Brinkman and Costley, can be very useful as an alternative method, when there is no palpable carotid artery. When used properly, internal jugular vein is the first vessel encountered and this minimizes the risk of carotid artery puncture. We think of it as a safe approach, if there are some considerations. With the head turned aside $>15^{\circ}$ from its sagittal axis, internal jugular vein comes in close proximity with the trachea. So if the seeker needle has not identified the vein in less than 3 cm, it must not be inserted any

Figure 1: Proposed angles and directions for reducing the risk of tracheal tube cuff puncture during the specific procedure. In the upper figure (A), needle direction is on the sternal notch with the arrow pointing at the sagittal axis. In the lower figure (B), the angle of the needle is on the horizontal axis. The flexed line is for sternal notch, straight line for the posterior border of sternomastoid muscle and dotted line for the external jugular vein



further. It is best to align the needle with the sagittal axis and retry (Fig. 1A). Also it is very helpful to raise the needle axis about 20° and aim downwards (Fig.1B). It is obvious that the anatomic landmarks, such as the posterior border of sternomastoid muscle and the external jugular vein should be easily identified. In our cases, none of these precaution measures were taken possibly due to limitations of urgency.

In conclusion, we describe two cases of tracheal cuff puncture during attempted internal jugular vein cannulation. We think of this complication as preventable and avoidable, if certain measures are considered.

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ACKNOWLEDGEMENTS

We would like to thank Mr Douyiountzou Joseph, for his help with the pictures.

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Key-words: Cannulation, Jugular veins, Trachea