Accurate intraluminal placement of percutaneous dilatational tracheostomy tubes is but half the story

We commend the work of Coleman et al1 on the use of end-tidal carbon dioxide monitoring to confirm intratracheal cannula placement prior to percutaneous dilatational tracheostomy and support the use of this technique. The technique has been employed with success at our institution over the last few years. Indeed the first citation for this technique that we had found when we first used it was in correspondence by Russell et al2.

Accurate intraluminal placement of needle, cannula and guidewire are prerequisites for successful percutaneous dilatational tracheostomy, yet it is important to emphasize that damage to the trachea can and still does occur with dilation and tube insertion.

At this institution we are aware of one case which was subsequently referred to us of a tracheoesophageal fistula following percutaneous dilatational tracheostomy despite the use of bronchoscopy to confirm cannula and guidewire placement. Fernandez3 in his series of 162 critically ill patients reported three cases of posterior tracheal tears and one pneumothorax despite the use of a bronchoscope.

Practitioners need to remain aware that despite the use of bronchoscopic and end-tidal carbon dioxide techniques to confirm cannula and guidewire placement, serious complications can and will continue to occur with dilation and tracheostomy tube insertion.

References

Collapse during removal of an internal jugular venous catheter

We report a case of cardiovascular collapse that occurred in a 71-year-old man who was admitted to our Intensive Care Unit with respiratory failure and septic shock requiring ventilatory and inotropic support. The right internal jugular vein was cannulated with a triple lumen central venous catheter (CVP Catheter 3 Lumen, Abbott Critical Care Systems, U.S.A.) using Seldinger’s technique (without any complication) to facilitate the administration of inotropes. He improved gradually over the next 10 days with antibiotic therapy, and was later weaned off inotropic support and mechanical ventilation. A decision was then made to remove the internal jugular catheter.

The internal jugular venous catheter was removed with the patient lying in bed with a head-up tilt of 45°. After removing the catheter, firm manual pressure on a gauze swab was applied over the puncture site. About 30 seconds later, the patient suddenly developed a tonic clonic convulsion lasting 20 seconds associated with an arterial pressure of 55/39 mmHg and a sinus bradycardia of 50 per minute. The SpO2 was noted to be normal on 2 l/min

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FIGURE 1: Arrows indicating three lacerations on the valve’s edge.

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of nasal oxygen just before the convulsion. He was immediately laid supine and resuscitated. The cardiovascular effects responded rapidly to atropine 0.3 mg. However, he required assisted ventilation to maintain adequate oxygenation. A chest X-ray later revealed aspiration pneumonitis. The convulsion resolved spontaneously and he recovered full neurological function. He did not experience any further convulsive episode.

The cause of the convulsion was unclear. There was an initial concern with venous air embolism but there was no oxygen desaturation preceding the convulsion. Furthermore, in view of previous findings that the threshold for the lung to filter air is 0.3 ml/kg/min, and that a bolus of 2 ml/kg of air will produce cardiovascular collapse, it would seem unlikely that this amount of air could have been infused into the venous system during the removal of the central venous line. The temporal relationship between the pressure on the neck, hypotension and bradycardia and the convulsion suggested that the convulsion may have been a consequence of cerebral hypoperfusion. It is likely that our case illustrated a potential complication of neck compression during the removal of internal jugular venous access.

The convulsion and cardiovascular collapse are postulated to have occurred as the result of pressure on the carotid sinus. Excessive pressure on the neck may stimulate the carotid sinus. Carotid sinus hypersensitivity has been described in the elderly and postulated to be an important cause of syncope in this age group. Cardioinhibitory and vasodepressive effects resulting in asystole and reduction in systolic blood pressure exceeding 50 mmHg independent of bradycardia have been previously described. In addition, compression of the neck may also reduce blood flow to the head, especially in elderly patients with carotid artery disease, and may potentially lead to cerebral hypoperfusion. We caution all readers to avoid excessive neck compression during the removal of jugular intravenous catheters in the elderly patient.

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References

A disadvantage of self-inflating resuscitation bags

Self-inflating resuscitation bags have an advantage over flow-inflating resuscitation circuits because they do not require compressed oxygen for provision of mechanical ventilation. However, such devices should not be used to provide oxygen during spontaneous ventilation because they contain a fish-mouth or duck-bill flap valve which provides only a negligible flow of oxygen when the patient’s efforts fail to open the valve during inspiratory effort.

We measured the flow of oxygen escaping from the duck-bill valve of a number of Laerdal and Partner self-inflating resuscitation bags when supplemental oxygen was introduced at flows of 5, 10 and 15 litres/minute. Five infant-sized, nine child-sized and six adult-sized bags, all of varying ages, were tested. Flow escaping from the duck-bill valve was measured using a Timeter RT-200 (Timeter Instrument Corporation, St Louis, MO, U.S.A.). The average escape from infant-sized bags was 0.11, 0.17 and 0.30 litres/minute, from child-sized bags 0.12, 0.22 and 0.35 litres/minute and from adult-sized bags was 0.04, 0.11 and 0.17 litres/minute at introduced flows of 5, 10 and 15 litres/minute respectively. When not in use, we estimated the valve remained open from 0.5 to 4 mm in 11 bags but in nine bags was visibly closed.

We recommend that such devices not be used to provide oxygen by mask or endotracheal tube during spontaneous ventilation unless it can be assured that the duck-bill opens, otherwise the patient will inhale mainly expired gas from within the mask or tube and receive only negligible flows of oxygen.

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Use of the Diprifusor™ in a latex allergic individual

A 12-year-old girl with a bowel dysmotility disorder required weekly bowel washouts via a caecostomy...