Case Report

An unusual complication of percutaneous dilational tracheostomy

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Case Report

A previously healthy 60 year old female patient was admitted to a local hospital with sudden onset of giddiness, headache and loss of consciousness on 18th May, 04. A CT scan of the brain done revealed a subarachnoid haemorrhage with intraventricular extension and mild hydrocephalus. The patient was intubated and mechanically ventilated, and an extraventricular drain was inserted to decrease the intracranial pressure. Two days later the patient was transferred to our institution for further management.

On arrival in the ICU the patient had a GCS of 9T/15 and paucity of movements of both the lower limbs. Her admission vital signs were stable and arterial blood gases were normal. She was put on mechanical ventilation. Other than a leucocytosis (WBC count - 28,000) all her lab parameters were within normal limits. Her initial management consisted of mechanical ventilation, nutritional support, anticonvulsant prophylaxis with phenytoin sodium, antiedema measures with dexamethasone and nimodipine to counter cerebral vasospasm. She was empirically put on ceftriaxone while awaiting CSF and blood cultures.

Over the next 24 hours she was awake and obeying commands. Her GCS had improved to 11T/15 and hence she was weaned off the ventilator and extubated. However over the subsequent 24 hours her consciousness level deteriorated and she had to be reintubated. A repeat CT scan of the brain showed the continued presence of the SAH, while the hydrocephalus had settled. All other parameters continued to remain normal. Anticipating prolonged mechanical ventilation a percutaneous tracheostomy was done on day 8.

Percutaneous tracheostomy was done by the Ciaglia method and the entire procedure was done under bronchoscopic guidance. The site of the tracheostomy was 2 cms above the suprasternal notch. The first insertion of the needle was not visualised by the bronchoscopist even though air was aspirated. The needle was then repositioned and visualised. Serial dilators from 12 F to 32 F were used during the procedure. At the end of the tracheostomy a 7 mm cuffed endotracheal tube (Portex®) was introduced. During the entire procedure the patient remained on the ventilator. (Pressure control mode, Pressure control 20 cms H_2O, PEEP 5 cms H_2O, FiO_2 1.0) and maintained stable vital signs. Sedation and analgesia during this period was managed with a combination of Fentanyl, Midazolam and Propofol. Muscle relaxants were not used.

Immediately after the introduction of the tracheostomy tube there was difficulty in ventilating the patient. This was associated with high airway pressures (> 40cms H_2O), air leak around the cuff, reduced air entry in the right side and oxygen desaturation (Sp O_2 - 99% to 93% on FiO_2).

Her hemodynamic parameters continued to remain stable. (Figure 1 Chart) An arterial blood gas taken showed a rise in pCO_2 - 32 to 48 mmHg, drop in P/F ratio - 290 to 90 and a drop in pH from 7.45 to 7.32.

As there was some bleeding at the tracheostomy site, we suspected obstruction of the right main bronchus with

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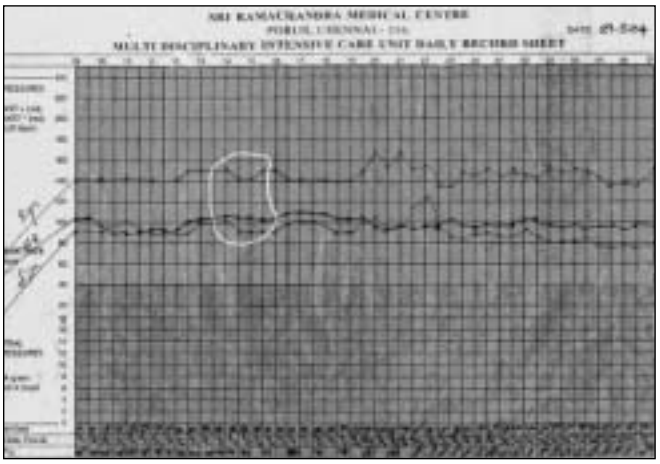

Figure 1: Vital Parameters. The encircled period represents the immediate post procedure phase.

a blood clot and a bronchoscopy was done followed by a broncho alveolar lavage (BAL). This did not reveal any clots and the fluid that returned after the BAL was clear. To our surprise a bed side chest X - Ray taken showed a tension pneumothorax on the right side (Figure 2 A & B). An intercostal drainage tube (ICD) was placed immediately. With this her lung compliance improved, SpO_2 returned to 100% and her P/F ratio improved to 140. She continued to have an air leak for the next two days. The intercostal drainage tube (ICD) was removed on the 4th day, she was weaned off the ventilator and subsequently transferred out of the ICU to a chronic care stroke ward.

Discussion

Percutaneous dilational tracheostomy (PDT) has increasingly replaced standard tracheostomy (ST) in the ICU as the method of choice. This is because of the low rate of complications associated with PDT. Moreover it is a procedure that can be done at the bed side in the ICU and hence is more cost effective.

Dulguerov et al[1] in a meta analysis looked at all studies comparing PDT and ST between the period 1960 to 1996 involving over 5000 patients. They found a higher incidence of peioperative complications with PDT. (10% vs 3%). This was also true for perioperative mortality (0.44% va 0.03%) and serious cardiovascular events (0.33% vs 0.06%). However, this paper represented early experience with PDT.

Cheng and Fee[2] did a Medline search on all studies comparing PDT and ST up to Jan 1999. Out of the 256 citations only 4 were prospective randomised control trials (PRCT). The meta analysis performed on 212 patients in these PRCTs, found a higher total complication rate (60%) with ST than with PDT (14%). Standard tracheostomy also had a higher incidence of stomal infection (29% vs 4%) and minor bleed (18% vs 7%). They reported a 4% incidence of pneumothorax with ST compared to 1% with PDT.

Fikker et al[3] in a review of published literature on PDT between 1986 and 2003 found a 1.4% incidence of subcutaneous emphysema and a 0.8% incidence of pneumothorax. On a subanalysis of all PDTs quoted in the literature between 1997 and 2002, a period when PDT was well established as the procedure of choice for ICU patients, they found the incidence of subcutaneous emphysema to be 1.5% and that of pneumothorax to be 0.6%.

In this patient the lack of associated symptoms of ten-

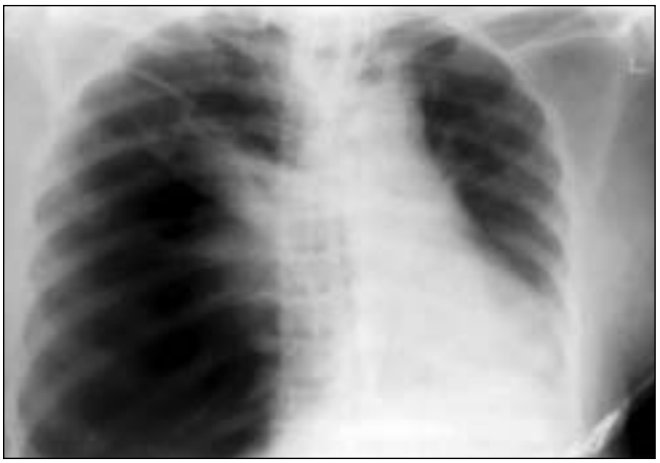

Figure 2A: Right sided pneumothorax.

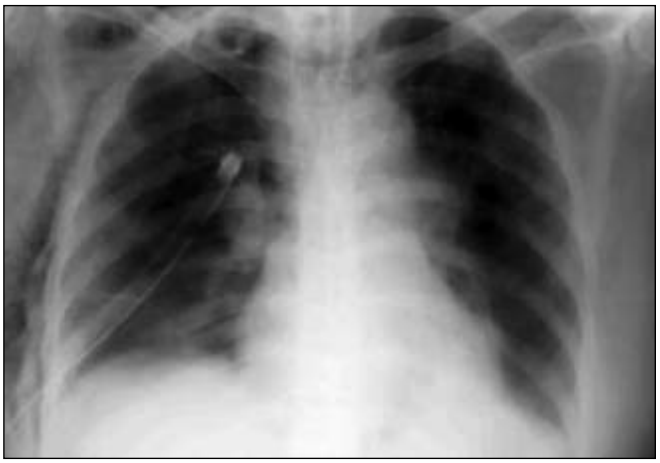

Figure 2B: Expanded right lung after ICD.

sion pneumothorax like hemodynamic instability or subcutaneous emphysema misled us initially to look for other causes of difficulty in ventilation. The fact that the whole procedure was done under bronchoscopic guidance also led us to believe that pneumothorax was an unlikely cause of high airway pressures and arterial desaturation.

In PDT pneumothorax is generally caused by a very low incision site, paratracheal placement of the initial needle puncture or posterior tracheal wall mucosal injury.[3] In this patient the site of incision was not too low. The surgeon had tapped air during the first attempt at needle placement. This needle however was not visualised bronchoscopically. This might have been due to initial paratracheal placement of the needle, which was later rectified. We did not attempt a bronchoscopy without the tracheostomy tube in situ. Thus we do not know if there was a posterior mucosal injury which was being obscured by the tracheostomy tube. However, during the procedure there was no bronchoscopic evidence of a posterior tracheal mucosal injury. Hence this is an unlikely cause for the pneumothorax.

In conclusion even though the incidence of pneumothorax is very low with PDT it is a possibility which has to be kept in mind always, even with procedures that are done under bronchoscopic guidance. It is important to remain vigilant for paratracheal placement of the needle or posterior mucosal tears.

References

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3. Fikker GB, et al: Emphysema and pneumothorax after percutaneous tracheostomy. *Chest* 2004;125:1805-14.