

P. Ceriana  
G. Bertoli  
S. Nava

## Tracheotomy cuff inflation and tube displacement

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A 72-year-old woman underwent coronary artery bypass and required tracheotomy for prolonged mechanical ventilation. Weaned from the ventilator, she was transferred to a rehabilitation centre. On admission, she had an 8-mm cuffed tracheotomy tube and was fed with a gastric tube for mild dysphagia. In order to prevent inhalation, the tube cuff was maintained inflated.

During the night she experienced an episode of dyspnoea, treated with tracheal suction and nebulized bronchodilators. During the subsequent pulmonologist consultation, the patient had normal breathing rate and oxygen saturation, and the tracheotomy cuff was kept inflated at pressure of 35 cmH<sub>2</sub>O for proper airway seal. Clear chest sounds were appreciated and sudden bouts of non-productive cough persisted but only in supine position, although signs of tirage were absent and sounds of stridor were not appreciable during neck auscultation. Chest X-ray confirmed correct feeding tube placement and excluded new pulmonary infiltrates; fibre-optic bronchoscopy did not evidence abnormal findings. New episodes of dyspnoea arose during the following nights, and multi-slice computer tomography (CT) of the neck and chest was carried out, to obtain a three-dimensional reconstruction of the tracheobronchial tree [1].

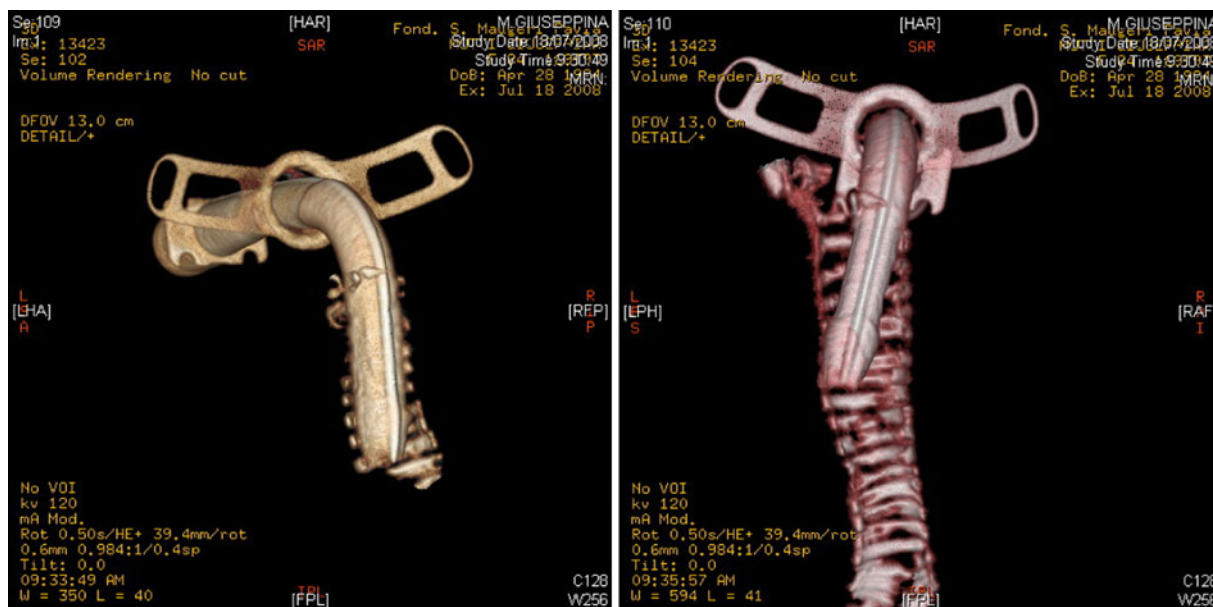
Figures 1 and 2 show the trachea reconstructed longitudinally: with the

cuff inflated the distal tip of the tracheotomy tube shifted towards the posterior tracheal wall, partially occluding the airway space (Fig. 2). With the tracheotomy cuff deflated (Fig. 1), there was correct alignment of the tube along the tracheal axis.

Videofluoroscopy [2] carried out on the same day showed only mild dysphagia for fluids, while thicker foods were swallowed correctly; therefore it was decided to maintain the tracheotomy tube cuff deflated and to restore oral feeding with a semi-liquid diet. No new dyspnoeic episodes ensued, and the subsequent hospital stay was uncomplicated.

## Discussion

Tracheotomy tube displacement frequently causes occlusion of the distal tube tip [3]; current directions [4] recommend to keep the tube cuff at a pressure not higher than 30 cmH<sub>2</sub>O. In the present case nocturnal dyspnoea was caused by intermittent



**Fig. 1–2** Three-dimensional CT reconstruction of the trachea from a longitudinal view. **Fig. 1** When the tracheal tube cuff is deflated, the tube maintains its correct position along the tracheal

lumen. **Fig. 2** The same view taken with the tracheal tube cuff inflated: lateral and backward displacement of the tube with partial occlusion of the distal tip against the tracheal wall can be seen

displacement of the tracheotomy tube, and the problem was resolved by deflation of the cuff. The cuff pressure, although slightly higher than recommended, could not be considered dangerously overinflated, at least in the short-term period. Upon completion of three-dimensional CT reconstruction of the tracheobronchial tree, it was possible to understand that displacement of the tracheotomy tube was mainly caused by inflation of the cuff and was partially dependent on posture, since the problem occurred only in supine position. Having performed tracheoscopy only in the semiorthopnoic position, we cannot exclude that fibre-optic endoscopy in supine position could have resolved the correct diagnosis, but it must be pointed out that the three-dimensional CT images gave a fundamental piece

of information, not achievable with endoscopy alone.

In conclusion, CT scan with three-dimensional airway reconstruction turned out to be crucial for correct interpretation of a problem connected to a misplaced tracheotomy tube.

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P. Ceriana (✉) · S. Nava  
Respiratory Intermediate Care Unit,  
IRCCS Fondazione “S. Maugeri”,  
Pavia, Italy  
e-mail: pceriana@fsm.it

G. Bertoli  
Radiology Department,  
IRCCS Fondazione “S. Maugeri”,  
Pavia, Italy