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Editorial

Aspiration Pneumonia in Patients with a Tracheostomy Tube

Rumi Khajotia[1]* and Kersi R Khajotia[2]

[1]Consultant Respiratory Physician, Hospital Tuanku Ja'afar and Associate Professor, International Medical University, Seremban, Malaysia

[2]Medical Intern, MIMER Medical College, Pune, India

***Corresponding Author:** Rumi Khajotia, Consultant Respiratory Physician, Hospital Tuanku Ja'afar and Associate Professor, International Medical University, Seremban, Malaysia.

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Pulmonary aspiration is known to occur when materials such as saliva, food particles, fluids or gastric contents enter from the oropharynx or gastrointestinal tract into the larynx and lower respiratory tract. This is usually accompanied by a normal physiological response, such as repeated coughing.

In elderly patients with a weak cough reflex, aspiration of contents may occur silently with no obvious clinical signs of aspiration. This is commonly known as 'subclinical aspiration'.

Aspiration per se is not completely uncommon. It is believed to occur in 40% - 45% of healthy people while sleeping. In comparison, aspiration occurs in nearly 65% - 70% of individuals with an impaired level of consciousness and in up to 40% of individuals who are fed via nasogastric (NG) tube.

Surprisingly, aspiration of oropharyngeal contents leading to atelectasis and bronchopneumonia is seen in as many as 50% - 75% of individuals with tracheostomy tubes [1-3].

One study demonstrated evidence of aspiration in 69% of a group of surgical patients with tracheostomies [2]. Aspiration was determined by putting a few drops of an aqueous solution of Evans blue dye on the patient's tongue every 4 hours. Routine suctioning and tracheostomy care were carried out. Any evidence of bluish discoloration of tracheostomy secretions obtained on suctioning through the tracheostomy tube was considered positive evidence of aspiration. The test was continued for 48 hours.

Therefore, in order to decrease this high incidence of aspiration, tracheostomy tube cuff modifications were studied to determine their ability to act as a barrier against aspiration.

In one trial [4], forty medical and surgical patients with recent tracheostomies were studied. Twenty-seven patients were men while thirteen were women and they ranged in age from 20 to 83 years. The indications for tracheostomy in these patients included respiratory insufficiency, good tracheal toilet, or postoperative care after a head and neck operative procedure. The time duration between the performance of the tracheostomy and the beginning of the study varied between 1 to 15 days. Patients were assigned to one of three groups. In group I, the tracheostomy tube was a standard uncuffed metal tracheostomy tube or a small-volume, high-pressure cuffed tube. In this group of patients the aspiration test was positive in 13 out of 15 patients (87%).

In group II, patients had a high-volume, low-pressure cuffed tracheostomy tube (HVLP), with the cuff inflated to the minimum pressure allowing an airtight seal. In this group of patients positive aspiration test was noted in only 2 out of 13 patients (15%).

In yet another group of patients (group III), a tracheostomy tube with a large polyurethane sponge-filled cuff was inserted. Air was initially withdrawn from the cuff to collapse the sponge in order to permit insertion. Once inserted, the sponge was allowed to expand

and form an airtight seal with the trachea. In this group of patients, 2 out of 12 had a positive aspiration test (17%). The presence of a nasogastric tube, head and neck operative procedures, altered consciousness and a supine position did not appear to correlate with an increased incidence of aspiration in these patients.

This study confirmed the high incidence of aspiration in patients with standard tracheostomy tubes. In the two study groups in which tracheostomy tubes with large-volume, low-pressure, large-contact-area cuffs were used, the incidence of aspiration was decreased from 87% to 15% and 17%, respectively [4].

Nowadays, newer modified tracheal cuffs made of latex with inflation characteristics that allow the tracheal wall pressure to remain constant and avoid aspiration due to the soft low-pressure cuffs conforming better to the anatomy of the trachea, are widely used. Rather than sealing the space between the trachea and cuff by inflation of a high-pressure cuff with resulting ischemia and necrosis of the mucosa and underlying cartilage and consequent distortion of the trachea, the newer cuffs readily change their shape to comfortably fit around the tracheal rings and spaces over a large area, allowing for a seal at much lower pressures [5]. In addition, with less dilatation of the trachea, swallowing is not interfered with, which makes aspiration less likely.

Studies have also demonstrated that these tubes can be left in place with the cuff inflated for longer periods of time without causing tracheal damage. Moreover, because of the large volume capacity and elongated shape, there is more contact area between the cuff and trachea, thereby creating a more satisfactory seal. As a result of these modifications in tracheostomy cuff design, the long-term inflation of a tracheostomy cuff in order to prevent aspiration pneumonia seems feasible without the risk of tracheal damage.

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