Case report

Tracheal swab from front of neck airway for SARS-CoV-2; a bronchial foreign body

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SUMMARY
We report the case of a bronchial foreign body, following a tracheostomy site swab for SARS-CoV-2, aiming to raise awareness and vigilance. A qualified nurse was performing a routine SARS-CoV-2 swab on a 51-year-old woman, fitted with a tracheostomy in the recent past following a craniotomy. This was part of the discharging protocol to a nursing home. During the sampling, part of the swab stylet snapped and was inadvertently dropped through the tracheostomy site. Initial CT imaging was reported as showing no signs of a foreign body but some inflammatory changes. Bedside flexible endoscopy through the tracheostomy site revealed the swab in a right lobar bronchus. This was subsequently removed by flexible bronchoscopy. This case highlights the need for clear guidance on how samples for SARS-CoV-2 are taken from patients with front of neck airways (laryngectomy/tracheostomy) and the potential pitfalls involved.

BACKGROUND
The novel COVID-19, SARS-CoV-2, is currently a pandemic. While in most cases, only a mild illness ensues, severe disease can be complicated by Acute Respiratory Distress Syndrome, septic shock, cardiac injury and death. The risk of spread of this virus has led to stringent measures being implemented both in hospitals and society in general. At our university, all admissions are being swabbed for SARS-CoV-2. Real-time reverse transcriptase PCR (rRT-PCR) of a combined oropharyngeal and nasopharyngeal swab is used to confirm diagnosis.

Patients with front of neck airways, either in the form of a laryngectomy or tracheostomy stoma site, present a challenge in terms of testing for SARS-CoV-2. There is no current clear guidance on how these patients should be tested. In addition, questions remain around whether the exclusion of the upper airway in laryngectomy patients affects the sensitivity of rRT-PCR testing in nasopharyngeal and oropharyngeal swabs. The potential pitfalls of taking a swab from a tracheostomy site are highlighted clearly by this case.

CASE PRESENTATION
A 51-year-old woman presented with temporal lobe thrombosis complicated by haemorrhagic transformation. This required neurosurgical intervention in the form of a craniotomy and evacuation of haematoma and she was transferred to our institute with a tracheostomy tube in situ. Prior to discharge to a nursing home, a swab was taken to test for SARS-CoV-2, as per protocol prior to transfer.

A mucosal swab was attempted through the tracheostomy tube. During this process, the nurse felt the swab stylet snap with the distal end falling into the trachea, although she was not certain. The patient became momentarily unsettled with her oxygen requirements increasing to 4 L/min from 2 L/min. She quickly returned to her normal, with her oxygen saturation levels maintained at baseline levels of 88%–92% on 2 L/min of O₂, considering her background of chronic obstructive pulmonary disease.

The culture swab used at our institute is a Sigma Virocult, a small vial with 1.0 mL medium and a standard Sigma swab (figure 1). The bud type is cellular foam. The swab's stylet length is 15 cm and this breaks into two parts with the distal part (bud end) inserted in the vial.

A plain radiograph was performed (figure 2), which was unremarkable. A CT scan was then performed and initially reported as showing no signs of a foreign body, but rather signs of infective...
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changes in the posterior segment of the right lower lobe. Later, an addendum report of the CT scan raised suspicion of a foreign body as subtle signs were identified (figures 3–5).

A decision had been made for a flexible endoscopy, a high-risk procedure in SARS-CoV-2 era, to take place. This was performed through the tracheostomy site using a disposable flexible Ambu aScope 4 RhinoLaryngo Slim device. The swab was identified on the right side, in a lobar bronchus (video 1) and was subsequently removed by flexible bronchoscopy.

DISCUSSION

Accurate and prompt detection of SARS-CoV-2 is essential to controlling outbreaks both in hospitals and in the community. Diagnosis is usually confirmed by rRT-PCR of combined nasopharyngeal and oropharyngeal swabs. There have been recent studies into whether the SARS-CoV-2 virus can be detected from other tissue samples. One study which included 1070 tissue samples from 205 patients with COVID-19 found that bronchoalveolar lavage fluid showed the highest positive rates (93%). This was compared with 63% for nasal swabs and 32% for pharyngeal swabs.

There is currently no guidance on how patients with front of neck airways should be tested. The question arises as to how

Figure 3  The coronal reformatted image shows slight narrowing of the bronchus at the same level as the axial images due to the foreign body (white arrowhead).

Figure 4  On lung windows, a soft tissue density is seen within the medial right lower lobe bronchus, just distal to the apical branch, across serial axial 1 mm CT slices. Two examples are provided 3 mm apart (white arrow).

Figure 5  On lung windows, a soft tissue density is seen within the medial right lower lobe bronchus, just distal to the apical branch, across serial axial 1 mm CT slices. Two examples are provided 3 mm apart (white arrow).

Video 1  Flexible endoscopy through tracheostomy site.
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The biodistribution of SARS-CoV-2 is affected in these patients, especially in laryngectomy patients where there is an exclusion of the upper airway. The US’s Centers for Disease Control and Prevention recommends a lower respiratory aspirate in special clinical circumstances such as patients on mechanical ventilation. The National Tracheostomy Safety Project’s statement on considerations for tracheostomy reiterates that tracheal aspirates are preferable to mucosal swabs but does not outline when tracheal aspirates should be taken.

The above case highlights the potential dangers of taking a mucosal swab from a tracheostomy site. Hightened concerns around SARS-CoV-2 and wearing full personal protective equipment increase the probability of human error occurring.

Learning points

► There is lack of guidance on how to test patients with front of neck airway for SARS-CoV-2.
► Mucosal tracheal swab through a tracheostomy tube carries an increased risk and appropriately designed sampling devices, which among else would be radiopaque, should be used.
► Despite the sensitivity of a tracheal aspirate being higher than that of an oropharyngeal/nasopharyngeal swab, further research is needed to clarify the increased risk of aerosolisation in this cohort of patients.
► CT imaging cannot always exclude a foreign body bronchus and communicating detailed clinical information to radiology colleagues is, as always, of paramount importance if there is suspicion of a foreign body.
► Visualisation of the airway should always be considered as the examination of choice in the absence of any contraindications.

There is a need for clear guidance on how to test patients with front of neck airways for SARS-CoV-2. This will be dependent on two main factors. First, how a front of neck airway affects the biodistribution of SARS-CoV-2 in the mucosa of the oropharynx and nasopharynx and second, understanding of the risk of increased aerosolisation associated with taking any sample from a tracheostomy site. Further studies are needed to shed light on the above.

Contributors

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