Cerebrospinal fluid leak following a COVID-19 nasopharyngeal swab

Thomas Hill[1]
Stefan Sivapatham[1]
Christopher Metcalfe[1]
Sevina Tzortzis[1]
Author details can be found at the end of this article
Correspondence to:
Thomas Hill;
thomas.hill12@nhs.net

Introduction

Nasopharyngeal swabbing is a key tool in testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and managing the COVID-19 pandemic. Testing is continuing on a mass scale, but there is inconsistency among official sources on the best technique for taking a swab.

This report details a case of an adult developing unilateral rhinorrhoea following nasopharyngeal swabbing. Subsequent nasendoscopy and biochemical testing confirmed the presence of a cerebrospinal fluid (CSF) leak. The patient underwent a successful surgical repair at a specialised centre.

Guidance for a safe and uniform nasopharyngeal swab technique is recommended to prevent this adverse outcome. Viable alternative testing modalities for SARS-CoV-2 are under investigation.

Discussion

Nasopharyngeal swabbing is a key tool in testing for SARS-CoV-2 and subsequently managing the COVID-19 pandemic. Similar cases to this one have been reported (Sullivan et al, 2020; Alberola-Amores et al, 2021; Ovenden et al, 2021; Paquin et al, 2021; Rajah

Case report

A 60-year-old white British woman developed a new onset cough and malaise. To test for SARS-CoV-2, she inserted a nasopharyngeal reverse transcription polymerase chain reaction swab vertically into her right nostril and continued to advance the swab until resistance was felt. She reported some discomfort at the time of the swabbing.

Her swab test returned a negative result and upon recovery from her acute illness, she presented to the emergency department with a 16-day history of right-sided rhinorrhoea, a metallic taste and constant headache. The rhinorrhoea was continuous, straw-coloured and more profuse when bending over or leaning forward. She denied any symptoms of meningitis and was otherwise systemically well. Significant past medical history included hypothyroidism, hypertension and a cholecystectomy. Medication history included levothyroxine, amlodipine and omeprazole. The suspicion of a CSF leak was low and the patient was discharged from the emergency department without radiological imaging. A nasal fluid sample was taken to test for beta-2-transferrin; unfortunately, the positive result which was published 3 days later was lost to follow up.

Three months later her rhinorrhoea continued to persist, so she was reviewed in an outpatient ear, nose and throat clinic. A fibreoptic nasendoscopy showed a possible mucosal breach in the region of the posterior ethmoid air cells and clear discharge. A repeat nasal fluid sample tested positive for beta-2-transferrin, suggestive of a CSF leak. Interestingly, contradictory to these findings, a computed tomography scan found no evidence of a skull base defect (Figure 1). The patient was subsequently referred to a tertiary centre for surgical intervention to repair the skull base defect.

Intrathecal fluorescein dye was injected into the subarachnoid space 3 hours before surgery. Following an uncinectomy, bullectomy and posterior ethmoidectomy to access the skull base, fluorescein dye highlighted CSF flowing through a defect in the right posterior ethmoid bone (Figure 2). The defect was reduced with bipolar diathermy (Figure 3). A flap was created from the middle turbinate which was placed over the defect and sealed with Spongistan and Duraseal.

The patient was followed up after 4 weeks and reported resolution of her presenting symptoms and a marked improvement in quality of life.

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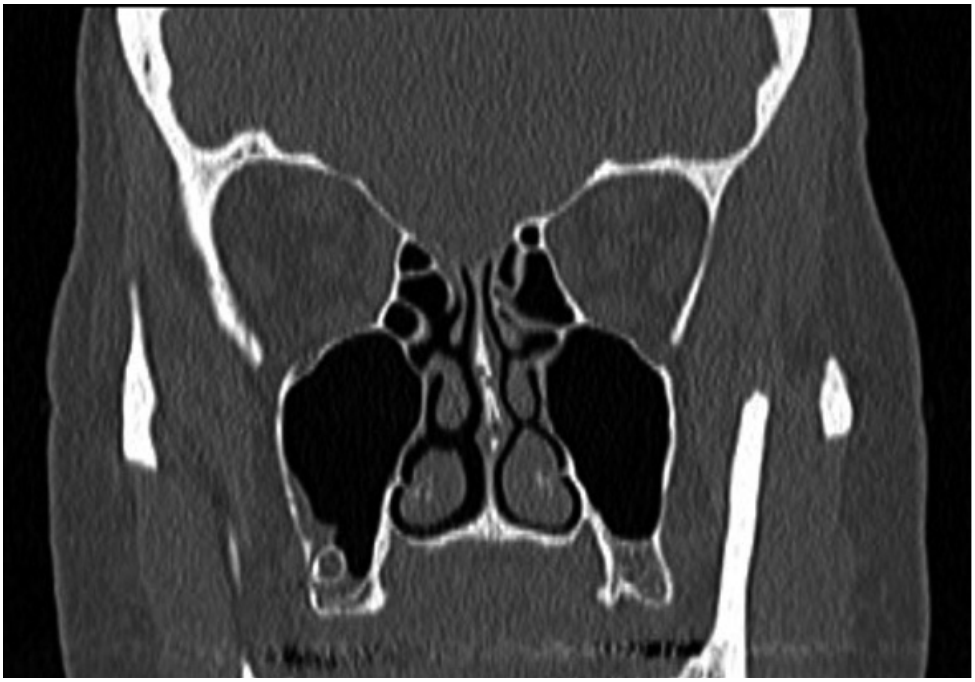

Figure 1. Computed tomography scan of the ethmoid and maxillary sinuses in coronal view.

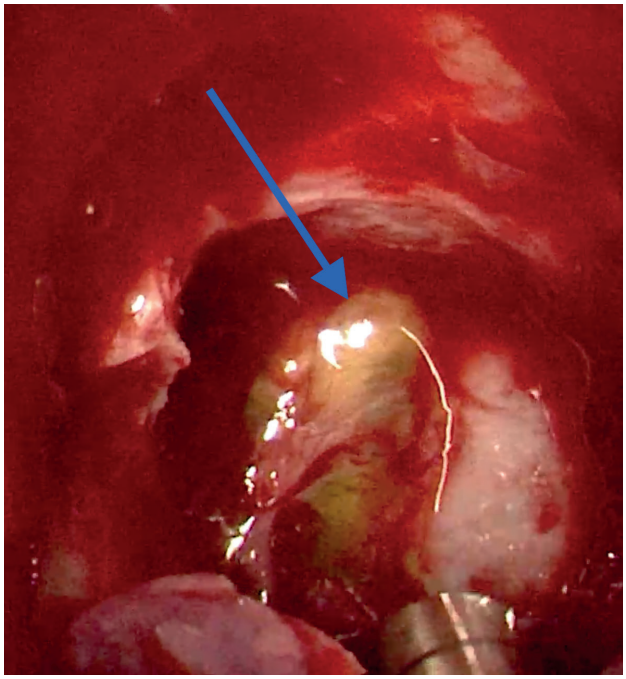

Figure 2. Endonasal image of the defect in the right posterior ethmoid causing a CSF leak.

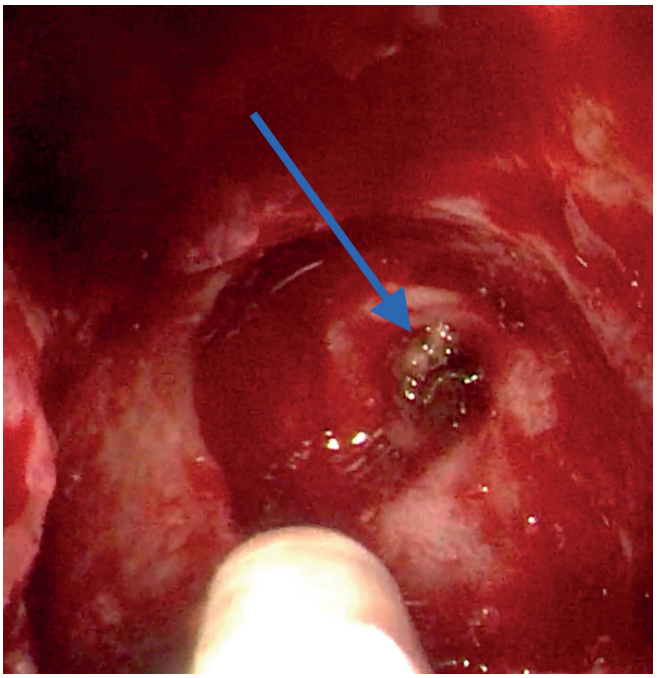

Figure 3. Endonasal image of the defect after reduction by bipolar diathermy.

and Lee, 2021), highlighting that a CSF leak is a rare but possible complication of nasopharyngeal swabbing. All reported cases presented with unilateral rhinorrhoea and three patients out of the five also described a metallic taste.

This case report emphasises that a presentation of unilateral rhinorrhoea in the context of a previous endonasal swab should prompt further evaluation through biochemical analysis of the fluid to confirm the presence of CSF. This should be highlighted to doctors in primary and secondary care to avoid misdiagnosis. Meningitis is a documented and serious complication of CSF leak (Alberola-Amores et al, 2021; Holmes and Allen, 2021).

The UK government's websites provide instructions on swab technique, targeted to different demographics, although there are disparities between these instructions in terms

Learning points

- Unilateral rhinorrhoea and a metallic taste should be recognised as symptoms potentially suggestive of a CSF leak.
- Computed tomography may be a suboptimal imaging modality in the context of subtle base of skull defects.
- There is inconsistency among official sources on swab technique.
- Saliva testing has been shown to be as sensitive and specific as nasopharyngeal swabs in detecting SARS-CoV-2.
- Clear guidance for a safe and uniform nasopharyngeal swab technique is recommended.

of how far to insert the nasal swab and how many rotations to carry out (Public Health England, 2020, UK Health Security Agency, 2021). Video and image guides show the direction of swab taking to be along the dorsum of the nose, whereas other guidance states that swabs must be inserted along the floor of the nose to reach the nasopharynx safely and obtain a valid sample (Marty et al, 2020).

Saliva testing is as sensitive and specific as nasopharyngeal swabs in detecting SARS-CoV-2 and could be a viable alternative testing method (Butler-Laporte et al, 2021).

The authors call for a safe testing method for SARS-CoV-2, whether that involves a standardised swab technique or a transition to saliva testing.

Author details

[1]Department of Otorhinolaryngology, The Princess Royal Hospital, Apley, Telford, UK;

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