

Main Article

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Investigative strategies for fish bone foreign bodies during the coronavirus disease 2019 pandemic: an analysis of ENT UK guidelines

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Abstract

Background. By nature of their specialty, otolaryngologists are disproportionately exposed to coronavirus disease 2019 through aerosol-generating procedures and close proximity to the oropharynx during examination.

Methods. Our single-centre, retrospective study analysed the pertinence of guidelines produced by ENT UK to improve the investigation and management of suspected upper aerodigestive fish bone foreign bodies during the coronavirus disease 2019 pandemic.

Results. Our results demonstrated 43.3 per cent ($n = 13$) low-risk cases and 56.7 per cent ($n = 17$) moderate-risk cases. Nine fish bones (two low risk, seven moderate risk) were found; none of these were confirmed with X-ray and three (moderate risk) required nasoendoscopy for diagnosis. One patient required rigid pharyngoscopy.

Conclusion. This study confirms that soft tissue neck X-ray and flexible nasoendoscopy are unnecessary in low-risk cases; however, early nasoendoscopy in higher suspicion cases is appropriate. Recommendations are made about the long-term sustainability of these guidelines, and additional measures are encouraged that relate to repeat attendances and varying prevalence of coronavirus disease 2019 in the hospital catchment area.

Introduction

An ingested fish bone remains the most common presentation of suspected upper aerodigestive foreign bodies, accounting for up to 88 per cent of cases of ingested foreign bodies.¹ It is the most common ingested foreign body across Asian, Mediterranean and other coastal populations, and is particularly prevalent in the East London Bangladeshi population because of dietary habits.² The associated risk of airway compromise and aerodigestive perforation warrants immediate ENT assessment, with emergency removal under general anaesthetic required in extreme cases.

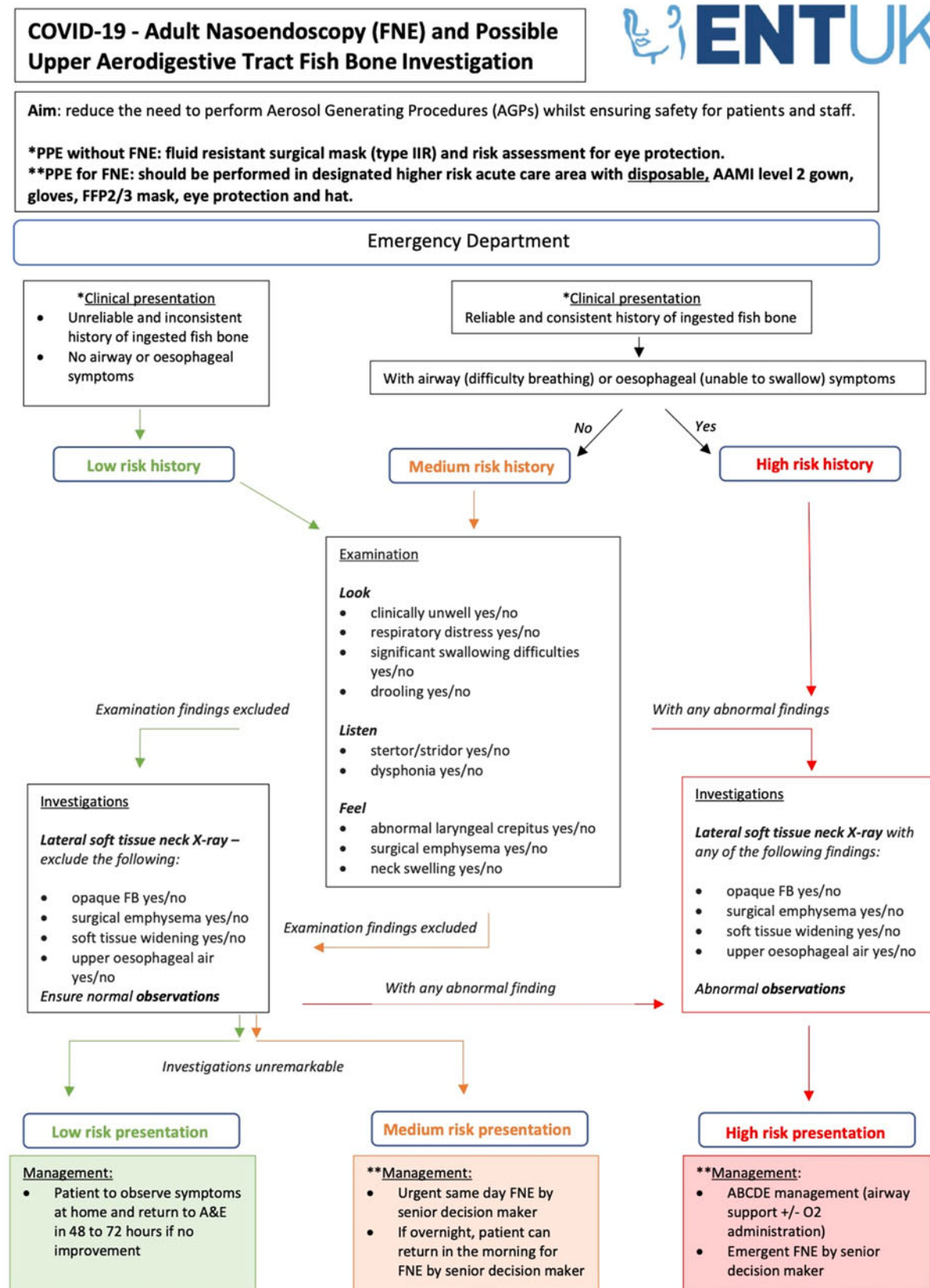
Prior to the development of bedside investigations such as flexible nasoendoscopy (FNE) and readily available imaging, the only way to gain direct visualisation of the suspected foreign body would be through rigid laryngopharyngoscopy under general anaesthesia. Flexible nasoendoscopy has obviated the need for this in most cases, and, although operator-dependent, it remains a key component of initial assessment for suspected aerodigestive fish bone ingestion owing to its ease and convenience. Radiological imaging can have an additional role, but may lack diagnostic accuracy (lateral soft tissue neck X-ray) or involve a significant radiation dose (computed tomography (CT)).

Though convenient, the heavily contested diagnostic accuracy of lateral soft tissue neck X-ray and the high radiation dose of CT imaging remain important considerations. Equally so, FNE is operator-dependant and requires a degree of patient co-operation. Therefore, the low skillset of junior doctors or unwillingness of some patients can result in significant findings being missed. Nonetheless, until now, lateral soft tissue neck X-ray and FNE have remained a key component of initial assessment for suspected aerodigestive fish bone foreign bodies.

It is well documented that the outbreak of coronavirus disease 2019 (Covid-19) disproportionately affects the health and wellbeing of otolaryngologists, and has sadly taken the lives of well-respected colleagues. The examination of patients' nasopharynx and oropharynx will frequently and often unavoidably involve aerosol-generating procedures (AGPs) that bring significant risk.³ In light of the pandemic, ENT UK has published guidance for clinicians involved in the care of patients who present in the emergency setting with a possible fish bone in the upper aerodigestive tract (Figure 1).⁴

Materials and methods

In this single-centre, retrospective analysis, all emergency admissions with suspected ingested fish bones between May and September 2020 were assessed. Routine demographics and clinical symptomatology were recorded, alongside investigations and the subsequent management plan. Patients were classified into low, medium or high-risk



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Fig. 1. ENT UK guidance for coronavirus disease 2019 (Covid-19) adult flexible nasoendoscopy (FNE) and possible upper aerodigestive tract fish bone investigation. AGP = aerosol-generating procedure; PPE = personal protective equipment; AAMI = Association for the Advancement of Medical Instrumentation; FFP2/3 = filtering facepiece code 2 or 3; FB = foreign body; A&E = accident and emergency; O2 = oxygen

presentation categories according to Covid-19 guidelines published by ENT UK. Key end points were the timing of and decision to perform FNE, as well as the confirmed finding

of an ingested fish bone. Subsequent re-attendance to emergency services was also noted. The exclusion criteria were children and food bolus foreign bodies.

Results

Demographics

Our study identified 30 patients presenting with a suspected fish bone in the aerodigestive tract. Patient demographics are illustrated in Table 1.

Imaging

Across our cohort, there were 13 low-risk presentations (43.3 per cent), as defined by the ENT UK Covid-19 guidelines, of which 2 were confirmed to be upper aerodigestive tract fish bones. There were 17 moderate-risk presentations (56.7 per cent), of which 7 were confirmed to be fish bones. There were no high-risk cases identified. Almost all patients (93.3 per cent) underwent lateral soft tissue neck X-ray, and just 10 per cent underwent neck CT.

Neither CT nor lateral soft tissue radiographs revealed any true positive aerodigestive fish bones. However, there was one false positive (hyoid bone) and four false negatives (with two fish bones in the right tonsil, one in the left tonsil and one in the right tongue base) on lateral soft tissue radiography.

Confirmed fish bones

Twenty patients (66 per cent) underwent FNE (7 low risk and 13 moderate risk), with just one low-risk patient undergoing delayed FNE the following morning. All endoscopic procedures were performed by senior house officers. Fish bones were confirmed with FNE in six patients (one low risk and five moderate risk); three fish bones were confirmed without FNE (all in the tonsil; one low risk, two moderate risk). Of those patients who underwent FNE, three had a tonsillar fish bone (one low risk, two moderate risk) where direct vision would have sufficed to make the diagnosis. The remaining fish bones were all in moderate-risk patients, and were found in the vallecula, tongue base and piriform fossa on FNE. All fish bones were removed under direct vision, apart from that located in the piriform fossa which required panendoscopy.

There were no re-presenting cases during our study, and all patients discharged without confirmation of a fish bone were offered safety-netting advice to return if symptomatology persisted or worsened (Table 2).

Discussion

Key findings

Our study confirms that performing FNE on low-risk patients during the Covid-19 outbreak does not result in a greater chance of diagnosing aerodigestive fish bones. The one fish bone found in a patient with a low-risk presentation would have been discoverable via more comprehensive oral examination. Our findings also suggest that junior staff have overperformed these procedures, when direct visualisation is sufficient to identify and remove a fish bone; such practice is not in accordance with current Covid-19 guidelines. Indeed, of 20 patients who underwent FNE, 3 had fish bones found on direct oral examination. Although many patients underwent supplementary imaging, either X-ray, CT or both, there was no diagnostic benefit.

We can therefore conclude that risk-stratifying patients based on clinical history and symptomatology alone remains an effective way of reducing the exposure of clinicians and clinical spaces to aerosols without significantly risking a

Table 1. Patient demographics and symptomatology

Parameter	Value
Patients (n (%))	
– Total	30 (100)
– Male	10 (33.3)
– Female	20 (66.6)
Mean age (years)	36.4
Symptoms (n (%))	
– Dysphagia	13 (43.3)
– Odynophagia	26 (86.6)
Mean time to presentation (days)	6

Table 2. Flexible nasoendoscopy and confirmed fish bones

Parameter	Low risk	Moderate risk
Patients undergoing FNE	7	13
Confirmed fish bones	2	7
– Via FNE	1	5
– Via direct vision	1	2
Site of fish bone	2	7
– Tonsil (seen without FNE)	2 (1)	4 (2)
– Vallecula	–	1
– Tongue base	–	1
– Piriform fossa	–	1

Data represent numbers of cases. FNE = flexible nasoendoscopy

missed foreign body. For this reason, we agree with the decision not to perform immediate FNE on low-risk patients, but to reserve it for higher-risk patients.

Decision to perform nasoendoscopy

Low-risk patients all had fish bones embedded in the tonsil. Despite oral examination being sufficient for confirmation, some patients still underwent FNE. Additionally, other patients who presented with a low-risk clinical history often insisted on receiving FNE without any diagnostic success. Although ENT UK guidelines suggest that FNE should be avoided, patient anxiety and clinician uncertainty were probable contributing factors to further investigation. This will likely be the case for re-presenting patients, regardless of their risk classification.

Given the low probability of FNE identifying a true fish bone in low-risk cases, we agree with the ENT UK recommendation not to perform FNE in these patients. However, should patients re-present with consistent or worsening symptomatology, we believe that, with the advent of readily available personal protective equipment (PPE), FNE offers a simple way of investigating repeat attendees, regardless of their risk classification. This is not mentioned within the current guidelines, but will prevent the perpetual cycling of low-risk patients through the algorithm without further investigation.

Alternatively, CT imaging might provide more diagnostic certainty without operator- or patient-specific factors. Ultra-low-dose CT has been shown to offer 100 per cent sensitivity and 97.8 per cent specificity in diagnosing oesophageal fish bones, and could provide a coronavirus-secure investigation

for these patients. In facilities where this is not readily available or where image reporting is delayed, FNE with adequate PPE can remain a suitable alternative.

Soft tissue neck X-ray

The sensitivity of soft tissue neck X-ray in the diagnosis of an upper aerodigestive fish bone foreign body has been heavily contested in the past, with numerous studies both endorsing and negating the practical uses of this investigation. In this study, soft tissue neck X-ray failed to identify any positive cases and provided no diagnostic correlation to those with confirmed fish bones.

This finding supports a study by Sanei-Moghaddam *et al.*, who analysed the lateral soft tissue neck X-rays of 698 patients with a suspected ingested fish bone over a six-year period.⁵ Only 23 cases were reported to have a fish bone on X-ray. Of these 23 cases, just 5 fish bones were found on FNE and removed. There were no false negative cases of fish bone on lateral soft tissue neck X-ray, thus suggesting that this investigation provides minimal value in the clinical setting.

In a study by Lue *et al.*, fish bones were inserted within the aerodigestive tract of cadaveric specimens, in order to calculate the efficacy of plain radiography.⁶ The sensitivity and specificity of soft tissue neck X-ray was 39 per cent and 72 per cent respectively.

Karnwal *et al.* assessed the utility of lateral soft tissue neck X-rays in diagnosing aerodigestive tract foreign bodies.⁷ Their study confirmed that 38.7 per cent of X-rays (24 of 62) demonstrated secondary signs of an ingested foreign body (e.g. loss of cervical lordosis, widened pre-vertebral shadow), with six of these confirming the presence of a foreign body. However, this study did not investigate the sensitivity of diagnosing fish bones specifically, which consisted of just 14.5 per cent of presentations.

Based on these findings, we support the notion that lateral soft tissue neck X-ray provides little diagnostic certainty and fails to identify true cases of ingested fish bones. Alternative investigative strategies such as FNE or low-dose CT are more appropriate, and should be considered for medium- or high-risk cases.

Risk-associated adaptations

Our study aimed to evaluate the clinical application of the recent ENT UK guidelines on the investigation and management of upper aerodigestive fish bones during the Covid-19 pandemic. These guidelines were written at a time of widespread infection, poor testing rates and heightened threat to ENT clinicians because of the close patient proximity required for clinical examination.

Though these guidelines provide a succinct and definitive way of reducing the number of AGPs, the question of their long-term suitability remains unanswered. At what point, if ever, should FNE be reintroduced into the routine clinical examination of these patient groups? It is quite possible that as rates fall, the prevalence of coronavirus amongst patients attending the accident and emergency department will dwindle, thus reducing the chances of transmission with AGPs. It would therefore be sensible for further guidance on when such strict measures should apply.

Our study confirms the success of risk-stratifying patients in accordance with the Covid-19 ENT UK guidelines, such that low-risk patients do not require immediate FNE. We also recommend the use of low-dose CT neck over lateral soft tissue neck X-ray, as the latter provides little clinical use. However, if sufficient PPE is available, FNE remains a supportive adjunct to investigation of these patients.

A trial by Curran *et al.*⁸ demonstrated, during the first wave of coronavirus cases, that simple-to-make devices could be worn by patients undergoing FNE as a means of significantly reducing clinicians' exposure to aerosol. It may well be possible for low-cost PPE to facilitate the use of routine FNE for suspected aerodigestive fish bones. However, we would advise that this only be the case when there is strict evidence to support the diagnosis; for example, in cases of repeat and moderate- or high-risk presentations.

Nasoendoscopy and junior trainees

It is well recognised that the learning curve of performing FNE (and in fact all procedures) improves exponentially with practice, until a plateau is reached. In accordance with ENT UK Covid-19 guidelines, for suspected fish bone cases, FNE must be avoided in low-risk patients, and performed by senior decision-makers in moderate- and high-risk patients.

Whilst it can be strongly argued that safe practice during the pandemic must take precedence over training opportunities, it is clear that if these guidelines are to be a permanent feature of clinical practice, the skillset of junior trainees may falter. It is our opinion that providing sufficient PPE to juniors in the emergency setting will enable better provision of training and allow us to give patients more definitive diagnostic answers regarding their presenting complaint.

Alterations to guidelines

Following the results of our study and analysis of the current guidelines, we believe the following recommendations should be considered: (1) maintain the position of risk stratification for suspected aerodigestive fish bone foreign bodies, as a means of directing coronavirus-safe clinical investigation; (2) ensure that low-risk patients do not undergo FNE unless they are a repeat attender for the same presenting complaint; (3) ensure that medium-risk patients are offered FNE by junior ENT staff immediately, regardless of timing; (4) manage high-risk presentations as stated by the current guidelines; (5) consider the use of low-dose neck CT rather than lateral soft tissue neck X-ray in the diagnosis and stratification of suspected fish bone ingestion patients; and (6) address the suitability of these guidelines in varying phases of the coronavirus pandemic, such that low Covid-19 prevalence areas do not endorse a practice of unnecessary AGP avoidance.

- Low-risk patients can be safely discharged without immediate flexible nasoendoscopy (FNE), in accordance with ENT UK coronavirus disease 2019 (Covid-19) guidelines
- Soft tissue neck X-ray provides little diagnostic utility in investigation and management of suspected upper aerodigestive fish bones
- Low-dose computed tomography (CT) remains a valid investigative strategy for these patients
- Patients returning with persistent or worsening symptoms should no longer be classed as low risk, and be investigated with FNE and/or CT
- Use of Covid-19 guidelines for aerodigestive fish bone investigation must be directly related to local coronavirus prevalence

Conclusion

Our study corroborates the success of the ENT UK Covid-19 guidelines for the diagnosis and management of suspected aerodigestive fish bone foreign bodies, whilst favouring the use of low-dose neck CT over soft tissue neck X-ray as an investigative modality. It additionally highlights that our staff

are performing unnecessary FNE on low-risk patients, against current guidelines. Recommendations are outlined regarding the need for a repeat attendance arm of the algorithm, the use of junior staff in performing FNE whilst wearing PPE, and the requirement of a coronavirus-severity scale to ensure that the 'gold standard' investigation of FNE can be implemented in areas of low virus prevalence.

Competing interests. None declared

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