

Potential aspiration hazard during orthognathic surgery: A case report

Saleh Z Alshehri¹, Randa Alfotawi^{2*}, Mohammed G Alkindi², Osama A Ibraheim³ and Razan A Ababtain⁴

¹Department of Oral and Maxillofacial Surgery, College of Dentistry, King Saud University, Saudi Arabia

²Department of Oral and Maxillofacial Surgery, King Khalid University Hospital Faculty of Dentistry, King Saud University, Saudi Arabia

³Department of Anesthesiology, College of Medicine, King Khalid University Hospital, King Saud University, Saudi Arabia

⁴Maxillofacial Surgery Resident, National Guard for Health Affairs, Saudi Arabia

Abstract

Introduction: Dislodgment of nasopharyngeal temperature probes and/or entrapment at the patient hypopharynx is rare complication after orthognathic surgery that may occur as a result of surgical manipulation itself or may be a consequence of factors related to the insertion and handling of the probe after extubation. However, the exact mechanism of this complication is not known.

Presentation of the case: We report the case of a patient who suffered from the dislodgment of a 12-cm temperature probe after orthognathic surgery. The surgery itself was uneventful. At the end of the surgery, the probe was believed to have been completely removed from the nasal cavity. The nasopharyngeal cavity was visually inspected while the patient was anaesthetized, and the trachea was still intubated. Extubation was successful, and the patient was moved to the recovery area. The patient was discharged from the hospital one day after she managed to take an oral fluid diet. At the follow-up visit on the 4th postoperative day, the patient presented with mild symptoms of a sore throat and mild cough. At the follow-up visit in the 3rd postoperative week, the patient reported one episode of vomiting and severe coughing, and 12 cm temperature probe was retrieved from her mouth by the patient.

Discussion and conclusion: After conducting a systematic literature review, we discuss surgical orthognathic surgery cases that have involved this rare complication. We also describe changes in our clinical practice after this event, and we envision that these modifications will have a positive influence on patient care.

Introduction

Maxillofacial surgery presents many challenges for anaesthesiologists. Primary among these challenges is the shared airway and the presence of anaesthetic equipment virtually within the surgical field. A wide variety of postoperative complications have been reported to accompany orthognathic surgery and have led to many problems in a number of cases [1]. The majority of these complications can be managed through proper treatment and with a sufficient understanding of their causes, but some complications are unusual and hard to predict [2]. The entrapment or dislodgment of the nasopharyngeal temperature probe after surgery is a rare complication [3]. However, to our knowledge, this is the 1st reported case of a missing temperature probe after orthognathic surgery.

The standards for monitoring patients during anaesthesia and recovery recommend continuous core temperature monitoring during anaesthesia because intraoperative hypothermia can result in serious adverse effects such as myocardial ischaemia, coagulopathy, and surgical wound infection. Nasopharyngeal temperature probes are commonly used for temperature monitoring during general anaesthesia and can serve as an alternative to oesophageal probes when appropriate. The advantages of nasal probes are their cost-effectiveness and their ability to measure core temperature. However, some authors claim that the use of an oropharyngeal probe is more expensive than a nasopharyngeal probe because the latter requires adequate mucosal attachment to accurately measure the core temperature [4].

Orthognathic surgery is recognized as a safe and predictable procedure due to an increase in knowledge about facial anatomy, and progress in orthodontic treatment over the last 30 years has resulted in this procedure having a low morbidity [1,5]. Initially, maxillofacial orthopaedic surgery was intended for the treatment of malocclusion in younger populations; however, with the development of this surgery, anaesthesia techniques were also changed and became more sophisticated, thus allowing the surgery to be performed for patients across different age groups with various craniofacial anomalies.

We report an unusual case of a nasopharyngeal temperature probe dislodged in the patient's hypopharynx for 21 days following an uneventful elective orthognathic surgery. Although no serious morbidity was observed in our patient, this case resulted in several changes to the guidelines for this routine anaesthetic procedure in our clinical practice.

***Correspondence to:** Randa Alfotawi, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, King Saud University, P.O. Box 60169, Riyadh 11545, Saudi Arabia, E-mail: ralfotawei@ksu.edu.sa

Key words: aspiration, hazard, orthognathic surgery, temperature probe, complications

Received: March 06, 2020; **Accepted:** March 17, 2020; **Published:** March 25, 2020

Case report

A healthy 23-year-old female presented with increased gingival display (> 7 mm) during social smiling. She was diagnosed with a class II skeletal dentofacial deformity due to an increase in the lower facial height and a high mandibular angle. Her medical history was unremarkable. Upon physical examination, the patient had a Mallampati-I airway, and her mental-hyoid distance and mouth opening were normal. She weighed 71 kg and was 1.78 m tall (BMI, 22.4 kg/m²). Intraorally, she presented with generalized mild periodontal Class II dental occlusion. Preoperative evaluation revealed that her blood pressure was 110/80, and her heart and lung examinations (electrocardiogram and chest radiography) were normal.

A single jaw osteotomy was planned for the case, resulting in a maxillary differential impaction of 6 mm anteriorly with partial inferior turbinectomy, and autorotation was allowed for the mandible to correct her mandibular prominence.

Preoperatively, in the waiting area, the patient received 2 mg of midazolam. After routine monitoring, the rapid sequence induction of general anaesthesia was achieved with intravenous fentanyl, lidocaine, and Propofol. Following tracheal intubation, a 9 French thermistor temperature probe (Model VER400-9, VHA Inc., Irving, TX, USA) was inserted approximately 12 cm into the nasopharynx.

The surgery started by marking the reference point using a K-wire near the nasal bone. Then, consecutive measurements were taken from the orthodontic brace to the reference point. Then, two cuts were placed 6 mm superior and inferior into the maxillary bone at the left I level. The cut was achieved using a surgical saw and a handheld motor (Stryker, Germany). The cut started at the lateral nasal wall, passed the pyriform area, extended back to the pterygomaxillary pttress and reached the junction.

This was followed by a maxillary down-fracture with a pterygomaxillary disjunction using a curved Obwegeser osteotome; no difficulties or injuries occurred. An inferior turbinectomy was performed bilaterally. After achieving the desired occlusion guided with a surgical stent, the bone was fixed using two plates and 6 screws on each side at pttress (pyriform and pterygomaxillary). The cinch suture was placed at the alar base to maintain inter alar distance, followed by soft tissue suture for the surgical sites using 3/0 Vicryl suture material.

After respiratory anaesthetics were stopped, the patient was maintained with 100% oxygen. The throat pack was removed by the surgeon with proper Yankauer suctioning of the oropharynx. Then, the patient was extubated, and the shortened nasopharyngeal temperature probe was not observed upon removal from the other nostril. The patient was transferred to another ward without any complications.

On the second postoperative day, the patient started to complain of mild throat discomfort on the lateral side and occasional cough. She was encouraged to follow an oral fluid diet. The patient was discharged on the 2nd after surgery without any other complaint except mild cough and throat discomfort. After one week, the patient returned with increasingly severe symptoms of cough and throat pain, which were very annoying to the patient. The patient was referred for endoscopic evaluation to explore her pharynx. The endoscopic report was negative and showed a normal supraglottic area and unremarkable laryngeal examination.

The patient was monitored closely with frequent follow-up. At two weeks postoperatively, the patient was interviewed in the outpatient



Figure 1. Severed temperature probe (12 cm long)

clinic, and she still complained of mild discomfort in her neck while speaking and inhaling, and she described feeling a foreign body. Three weeks after surgery, the patient started regular food habits, and the discomfort persisted. There was one attack of a severe cough and concomitant vomiting where she noticed that a long plastic covered object came out of her mouth (Figure 1). A close inspection of the distal probe confirmed our diagnosis; it had a bevelled cut end, and it was 12 cm long, indicating that it was part of the nasopharyngeal temperature probe. The inspection confirmed that it had been cut during the inferior turbinectomy procedure and that it was probably dislodged in the lateral pharyngeal wall for a long time without any remarkable gag reflex.

The patient immediately felt relief from the irritating symptoms in her throat. The patient was sent for PA chest X-ray radiography, which showed no remarkable findings. The patient's follow-up course was uneventful, and she was discharged after an 18-month follow-up period.

Patient's consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Discussion

We report an unusual case of a temperature probe severed during orthognathic maxillary osteotomy and turbinectomy procedures. What makes our case unique is the mechanism responsible for our observations. It is likely that the probe was dislodged within the lateral pharyngeal wall away from the gag reflex centre, thus causing mild symptoms and leading the surgeon to believe that the symptom was the normal throat discomfort that occurred following General Anesthesia. The persistent cough and discomfort after 1 week were alarming, and the patient was referred for endoscopic exploration, which appeared to be negative. X-ray radiography would have been an ideal investigation tool in this clinical scenario.

One may wonder why the patient's gag reflex was not activated and why she did not choke. The possible pathophysiology in this case is that the probe reached the patient's throat pack and dislodged beyond the sensory nerve ending area (an area supplied by the glossopharyngeal nerve, which includes the back of the tongue, the area around the tonsils, the uvula, and the back of the throat) after the throat pack was removed but before the patient's reflexes returned to normal after the anaesthetic effects wore off. Then, the temperature probe dislodged in the hypopharynx in the lateral pharyngeal wall, which is characterized by thick, deep, folded mucosa that make it difficult to explore even with endoscopy examination as in our cases. A similar incidence of aspirating foreign bodies without symptoms was reported by Mishra

et al. who reported an impacted metallic foreign body in the left lateral pharyngeal wall just above epiglottis [6]. Another asymptomatic 5-mm metallic object was seen in the retropharyngeal area and treated conservatively [7]. Ramdas et al, 1995 reported a case of a migrating intramural foreign body in the oesophagus [8]. The patient had a history of a foreign body in the aerodigestive tract, and radiologically, an open safety pin was found in the upper oesophagus. Endoscopy was performed and was found to be normal.

The other possible explanation is that this patient lacks a gag reflex with an intact reflexive pharyngeal swallow. It has been reported, high incidence rate, (37%) related to absence of gag reflex among patients, although they have an intact pharyngeal sensation [9]. One may infer patients may get normal muscle responsible about swallowing which works independently to those muscles controlling the gag reflex. Interestingly, swallowing reflexive reflex also acts as protective mechanism for upper respiratory system, it forces the glottis to close and clears the pharynx from residual food substance [9]. Our patient did not undergo further investigation regarding her pharyngeal sensation.

According to a literature search, the reported incidence of temperature probe hazards is low; one article reported the case of an accidental misplacement of the disposable plastic cover of a temperature probe in the nasopharyngeal cavity upon endotracheal extubation [10]. The cover was uneventfully extracted intact using a sinus scope, nasal speculum, and bayonet forceps [10]. Another incidence reported that the first nasopharyngeal temperature probe was dislodged during an elective revision laparoscopic Nissen fundoplication ligature, and the probe was retrieved immediately before the patient left the operating room [3]. Last, a case of severe bleeding from the nostril of a patient on anticoagulants was reported due to the improper handling of a temperature probe, which caused injury to the nasal mucosa [11].

As a result of this event, several changes were made to our anaesthetic and surgical practices to prevent the recurrence of this complication. First, we educated employees by reporting this case, warning employees about the potential for this complication during maxillofacial surgery and teaching them how to avoid such complications. Second, for patients with indwelling urinary catheters, we suggest that core temperature be monitored using a bladder probe (e.g., Model Bardex[®] Lubricath Temperature- Sensing Foley Catheter, C.R. Bard, Inc., Covington, GA, USA). Alternatively, when nasopharyngeal temperature monitoring is necessary, we suggest using a temperature probe that is sufficiently short to avoid hypopharyngeal or even oesophageal dislodgment during bougie dilator insertion [3]. However, studies have shown that more than half of blindly placed nasopharyngeal temperature probes in clinical practice are suboptimal [12].

Alternatively, using oropharyngeal probes has been discussed in the literature and can be a safe, especially in orthognathic surgery. Moreover, it has been shown that it is advisable to use oropharyngeal probes that show substantial temperature differences in the nasal cavity or oropharynx compared with the temperature in the upper

nasopharynx [4]. Therefore, the superficial insertion of the probe into the nasal cavity is less accurate than the deep insertion of a probe into the oropharynx if the probe is not placed optimally at the upper nasopharynx [4].

Third, the surgical and anaesthesia teams should communicate to ensure that all foreign bodies have been withdrawn from the mouth and nose except for the endotracheal tube and the oesophageal bougie. If there is any doubt, chest X-ray may be advisable before patient extubation.

In summary, we report the first case of nasopharyngeal temperature probe entrapment during elective orthognathic surgery that precipitated a continuous quality improvement project at our institution. We envision the previously mentioned changes in our clinical practice to have a positive influence on patient care and should be considered when caring for this surgical patient population.

Conflict of interest and funding

The author declare that they have no conflict of interest, and there is no funding for this paper.

Patient consent

Patient is consented for the publication of this manuscript.

References

1. Steel BJ, Cope MR (2012) Unusual and rare complications of orthognathic surgery: a literature review. *J Oral Maxillofac Surg* 70: 1678-1691. [[Crossref](#)]
2. Samuel RB, Chen YR, Chen PK (1995) Unusual complication of the Le Fort I osteotomy. *Plast Reconstr Surg* 96: 1289-1296. [[Crossref](#)]
3. Wass, Long TR, Deschamps C (2010) Entrapment of a nasopharyngeal temperature probe: an unusual complication during an apparently uneventful elective revision laparoscopic Nissen fundoplication. *Dis Esophagus* 23: 33-35. [[Crossref](#)]
4. Lim H, Kim B, Kim DC, Lee SK, Seonghoon Ko (2016) A comparison of the temperature difference according to the placement of a nasopharyngeal temperature probe. *Korean J Anesthesiol* 69: 357-361. [[Crossref](#)]
5. Robl MT, Farrell BB, Tucker MR (2014) Complications in orthognathic surgery: a report of 1,000 cases. *Oral Maxillofac Surg Clin N Am* 26: 599-609. [[Crossref](#)]
6. Mishra A, Shukla G, Bhatia N (2000) Oropharyngeal foreign body. *J Laryngol Otol* 114: 469-470. [[Crossref](#)]
7. Mehta AK, Panwar SS, Verma RK (2004) Retropharyngeal Foreign Body. *Med J Armed Forces India* 60: 390-391. [[Crossref](#)]
8. Ramdas (1995) Intramural migrating foreign body oesophagus. *Ind J Laryngol Otol Head & Neck Surg* 47:217-218.
9. Davies AE, Kidd D, Stone SP, MacMahon J (1995) Pharyngeal sensation and gag reflex in health subjects. *Lancet* 345: 487-488. [[Crossref](#)]
10. Kumar PA, Arora H (2006) Potential aspiration hazard when using a nasopharyngeal temperature probe with disposable cover. *J Clin Anesth* 18: 556-557. [[Crossref](#)]
11. Sinha PK, Kaushik S, DA, Neema PK (2004) Massive epistaxis after nasopharyngeal temperature probe insertion after cardiac surgery. *J Cardiothorac Vasc Anesth* 18: 123-124. [[Crossref](#)]
12. Lee J, Lim H, Son KG, Ko S (2014) Optimal nasopharyngeal temperature probe placement. *Anesth Analg* 119: 875-879. [[Crossref](#)]