

# Cervical spine osteosynthesis screw: a rare cause of late pharyngeal perforation

## Clinical Case

### Authors

**Patrícia Silva Sousa**

Serviço de Otorrinolaringologia, Centro Hospitalar de Trás-os-Montes e Alto Douro, Portugal

**Clara Magalhães**

Serviço de Otorrinolaringologia, Centro Hospitalar de Trás-os-Montes e Alto Douro, Portugal

**Diogo Sousa**

Serviço de Ortopedia, Centro Hospitalar de Trás-os-Montes e Alto Douro, Portugal

**António Lemos Lopes**

Serviço de Ortopedia, Centro Hospitalar de Trás-os-Montes e Alto Douro, Portugal

**Anita Cunha**

Serviço de Otorrinolaringologia, Centro Hospitalar de Trás-os-Montes e Alto Douro, Portugal; Serviço de Otorrinolaringologia, Hospital das Forças Armadas, Porto, Portugal

**António Castanheira**

Serviço de Otorrinolaringologia, Centro Hospitalar de Trás-os-Montes e Alto Douro, Portugal

**Correspondence:**

Patrícia Silva Sousa,  
Serviço de Otorrinolaringologia, Centro Hospitalar de Trás-os-Montes e Alto Douro,  
Avenida da Noruega, Lordelo, 5000-508, Vila Real, Portugal  
+351 259300500  
prssousa@chtmad.min-saude.pt

Article received on February 28, 2023.  
Accepted for publication on April 9, 2023.

### Abstract

Late-onset pharyngeal perforation is a rare complication of anterior cervical spine osteosynthesis. Clinical presentation is variable and may lead to serious complications. We present a 49-year-old male patient with a six-week history of throat pain and foreign body sensation. He had a previous documented odontoid fracture treated with osteosynthesis with an interfragmentary screw performed 30 years ago. A screw emerging at the level of the left tonsil was observed in the oropharynx, and it was inserted at the right postero-lateral hypopharyngeal wall. The integrity of the adjacent vessels was confirmed by imaging tests. The patient underwent screw removal by trans-oral approach with endoscopic observation, and was admitted for clinical surveillance, without further complications. The rarity of this condition hampers a consensus regarding the diagnostic and therapeutic approaches, and therefore, they must be individualized. In this clinical case, the patient was managed conservatively, and recovered without significant morbidity.

Keywords: late pharyngeal perforation; anterior cervical spine osteosynthesis; screw.

### Introduction

Anterior osteosynthesis of a cervical spine fracture using screws, plates, and other metal devices for fragment fixation is a widely used and usually well-tolerated surgical procedure.<sup>1</sup> Although rare, pharyngoesophageal perforation may occur as a complication in the peri- and immediate postoperative period of this procedure. Late perforation occurs years after the surgical intervention and is a less frequent complication<sup>2-5</sup>; few such cases of perforation in the pharynx have been described.

The clinical presentation of perforation varies from mild symptoms such as odynophagia and pharyngeal foreign body sensation to severe or even fatal complications such as

neck abscess and mediastinitis. As this is a rare clinical condition, its presentation, assessment, and therapeutic approach have not yet been established.<sup>1</sup>

Here, we present a rare clinical case of late pharyngeal perforation due to the extrusion of an osteosynthesis screw 30 years after its implantation in the cervical spine, as well as a literature review on the topic.

**Figure 1**  
Inspection of the oropharynx and visualization of a metal object (screw)



### Description of the clinical case

A 49-year-old man was referred to the emergency department because of odynophagia, dysphagia, and pharyngeal foreign body sensation for six weeks. He denied other symptoms such as sialorrhea, dyspnea, hemoptysis, headache, fever, and paresthesia. He gave a previous history of anterior cervical spine surgery in which osteosynthesis of a fracture of the odontoid process with an interfragmentary screw was performed 30 years previously in the context of polytrauma. On objective examination, specifically oropharyngeal inspection, a metal object was detected at the level of the left tonsil (Figure 1).

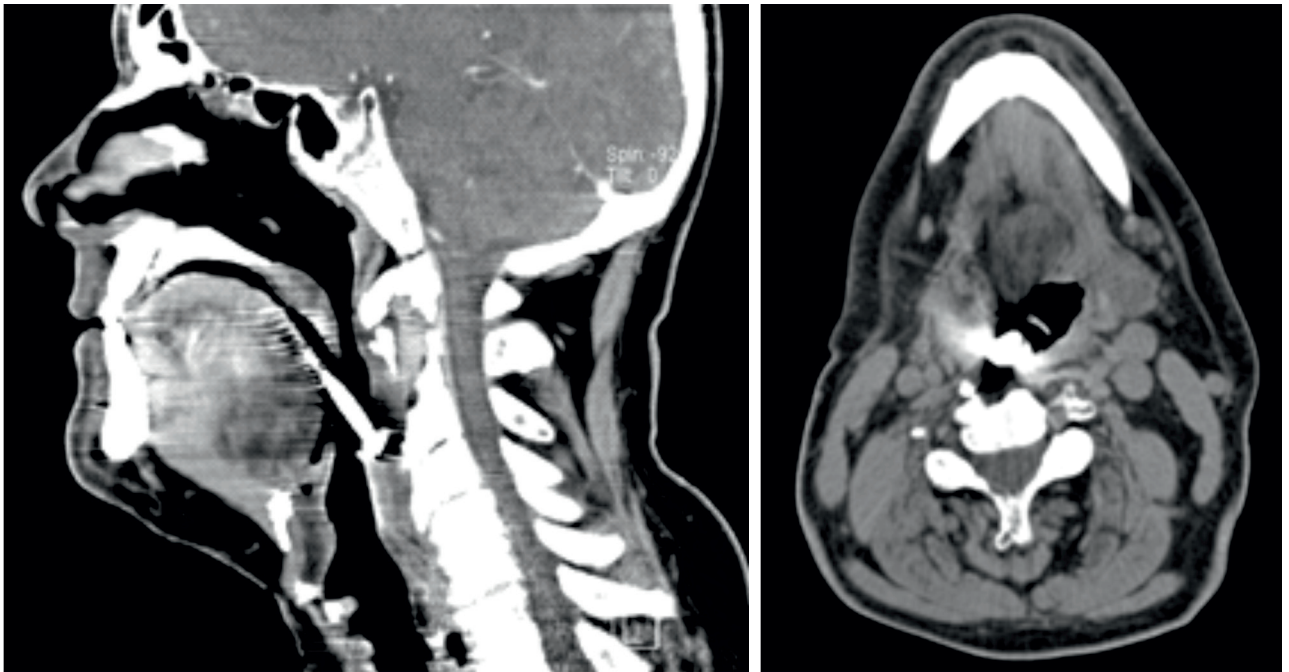
Fiber-optic pharyngolaryngoscopy showed that it was protruding at the level of the lateral wall of the right hypopharynx, with associated edema and hematoma of the adjacent tissues. Cervical X-ray (Figures 2 and 3) and computed tomography (Figures 4 and 5) confirmed the presence of a screw in the lateral wall of the right hypopharynx with an oblique trajectory and with the distal end at the level of the left

**Figures 2 and 3**  
Front and lateral X-ray images of the cervical spine showing the metal object (screw) lodged in the oropharynx



**Figures 4 and 5**

Cervical computed tomography sagittal and axial reformat showing the location of the screw and its previous trajectory in C2, as well as its relationship with the adjacent structures.



tonsil, causing hematoma of the wall and adjacent soft tissues but not compromising the integrity of the blood vessels. There were no other complications.

The foreign body was extracted transorally under local anesthesia and endoscopic control (Figure 6) without any complications at the otorhinolaryngology department.

The patient remained under clinical surveillance after evaluation by an orthopedist and confirmation of the absence of neurological deficits and spinal instability. He

was hospitalized and fed through a nasogastric tube for 48 hours. Subsequently, a liquid diet was given orally, which was well-tolerated.

The laboratory test results did not show systemic infection; however, intravenous antibiotics were administered-amoxicillin/clavulanic acid (1,200 mg every 8 hours) and clindamycin (600 mg every 6 hours for seven days).

The patient's progress during hospitalization was favorable, and control cervical X-ray and CT (Figures 7 and 8) did not show any complications.

The patient was discharged after seven days and referred to the otorhinolaryngology and orthopedics outpatient clinics.

Control magnetic resonance imaging was performed two months later and only showed signs of previous surgery, without sequelae of the screw migration or migration of any other type of osteosynthesis metal device.

**Figure 6**

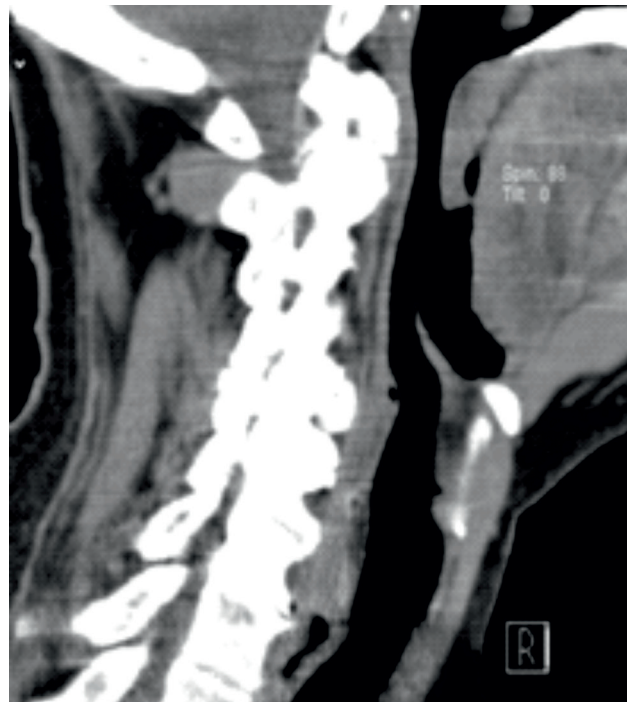
Image of the screw after its removal, measuring approximately 5.5 cm in length





## Figures 7 and 8

Lateral cervical spine X-ray and cervical computed tomography sagittal reformat performed seven days after the removal of the screw without evidence of any complications



## Discussion

There are few reports in the literature about the migration of screws used in cervical spine osteosynthesis and consequent late perforation of the pharynx with subsequent extrusion through the oral cavity.<sup>2,4-7</sup> As the complications can have devastating consequences, there are few reports of patients with mild symptoms, complete resolution with conservative treatment, and those without significant associated morbidity.<sup>4-7</sup> Based on the literature review, this is the first report of a clinical case with such a long interval (30 years) between cervical spine surgery and perforation of the pharynx because of the migration and subsequent extrusion of an osteosynthesis screw. Given the rarity of late perforation of the pharynx, its incidence has not yet been reported. The frequency of pharyngoesophageal perforation reported in the literature is 0.25%, corresponding in most cases to esophageal perforation.<sup>8</sup>

Pharyngeal perforation usually occurs in the early postoperative period or, exceptionally, late after surgery, up to approximately ten years after surgical intervention.<sup>3</sup>

The most frequent cause of pharyngeal perforation after anterior cervical spine surgery is the migration of the osteosynthesis material.<sup>1,6</sup> In such cases, several factors can precipitate this migration, with the most frequent being its inadequate insertion,<sup>2,4,6</sup> which is more common in perforations occurring in the peri- and immediate postoperative periods. Other precipitating factors include faulty material, excessive cervical spine mobilization, congenital anomalies of the spine, osteoporosis, and local infection.<sup>2,9</sup> The causes of late perforation of the pharynx are as follows: compression of the osteosynthesis material against the posterior wall of the pharynx resulting in ischemia, necrosis, and consequent perforation,<sup>1,2,6,7</sup> as well as diseases that weaken the muscles.<sup>10</sup> As our patient did not have imaging signs of congenital spinal disease, osteoporosis, infection, or a history of pharyngoesophageal or cervical disease, we assumed that the most probable cause was material migration due to cervical movement over several years. Although the mechanisms suggested for pharyngeal and esophageal perforations are

the same,<sup>6</sup> the pharynx is a less common site of perforation because of the differences between the anatomical features of the pharynx and esophagus, the greater resistance of the pharyngeal tissues<sup>3</sup>, and, most importantly, the level of the spine at which the surgery is performed. Spinal surgery is most frequently performed at the C4-C7 level,<sup>1,6</sup> which explains the lower incidence of perforation of the pharynx. The pharynx is affected when the surgery is performed at the C2-C3 level,<sup>2,6,7</sup> as in the case described herein.

Pharyngeal perforation has diverse clinical presentations. Perforation should be suspected when there is a previous history of anterior spine surgery and symptoms such as odynophagia, dysphagia, foreign body sensation, de novo tumefaction of the neck, fever, dyspnea, and cough,<sup>1,2</sup> and the extruding material is sometimes visible in the pharyngoesophageal region. Among these symptoms, dysphagia is the most frequently reported in the literature.<sup>6,10</sup> Complications such as the formation of a pharyngoesophageal fistula and cervical abscess may also occur ab initio,<sup>1,10</sup> with impairment of the airway<sup>9</sup> and aspiration pneumonia,<sup>1</sup> potentially leading to sepsis and even death.<sup>8</sup> The mortality rate is approximately 20% in the first 24 hours and increases to 50% afterward.<sup>1</sup>

In addition to pharyngeal and esophageal perforation, other complications may result from anterior spine surgery with migration of osteosynthesis material, including recurring lesions of the laryngeal nerve with paralysis of the larynx, lesion of the trachea, lesion of the large vessels, compression of nerve structures, cerebrospinal fluid fistula, and meningitis.<sup>2</sup>

The diagnostic and therapeutic approaches to pharyngeal perforations should be individualized by considering the severity and clinical course of the perforation, basal status of the patient, comorbidities, results of imaging exams, and complications.<sup>5</sup>

Regarding the diagnostic approach, some authors recommend that transoral endoscopy be initially performed.<sup>3,11</sup> This technique is associated with low morbidity and allows

direct access to the posterior wall of the pharynx, as was performed in the present case, for the initial diagnosis and treatment and has good results.

Moreover, imaging exams are an essential part of the approach to perforation. X-ray of the cervical spine reveals the presence of emphysema, pneumomediastinum, and the presence of air in the retropharynx and paravertebral spaces.<sup>1</sup> Cervical CT displays the location of the material and its relationship with the anatomical structures, involvement of the adjacent soft tissues and blood vessels, and complications such as hematoma, laryngeal lesion, abscess, and presence of extra-esophageal air.<sup>1,11</sup> The esophageal transit contrast exam also plays an important role in the evaluation of perforations and can detect the presence and extension of a pharyngoesophageal fistula.<sup>11</sup>

When these diagnostic exams are insufficient to diagnose the patient's condition or when there is a high probability of complications (such as infection), it may be necessary to perform surgical exploration<sup>1,6,10</sup> through emergency tracheotomy.<sup>9,10</sup>

Some authors recommend that in the case of a perforation without associated complications, especially small perforations (smaller than 1 or 2 cm),<sup>11,12</sup> conservative treatment should be preferred, including fluid therapy, intravenous antibiotics, and nasogastric tube feeding, with subsequent introduction of an oral liquid diet.<sup>2,6,11</sup> The literature shows that the timing is variable and that the spontaneous closure of the perforation and complications must be considered. Surgical closure is required in the case of perforations that do not close spontaneously.<sup>2</sup> When primary closure fails, or the defect is extensive, reconstruction should be performed in a one-stage operation using a muscle, microvascular, or other flap.<sup>1</sup>

Owing to the rarity of this clinical condition, there is no consensus regarding the diagnostic and therapeutic approaches; therefore, cases should be evaluated individually. It is important to have a high index of suspicion to ensure an early diagnosis and timely treatment and

prevent or minimize potential complications. In the clinical case described herein, based on other authors' recommendations, conservative treatment was performed, resulting in full recovery and no significant morbidity or sequelae.

### Conflict of Interest

The authors declare no conflict of interest regarding this article.

### Data confidentiality

The authors declare that they followed the protocols in use at their working center regarding the publication of the patients' data.

### Human and animal protection

The authors declare that they followed procedures according to the regulations established by the Ethics and Clinical Research Committee and the Helsinki Declaration of the World Medical Association.

### Privacy policy, informed consent, and approval by the ethics committee

The authors declare that they obtained written informed consent for the use of the patients' photographs in this article.

### Funding

The present study was conducted in the absence of any contribution, funding, or grant.

### Availability of scientific data

There are no publicly available datasets related to this study.

### Bibliographic references

1. Phommachanh V, Patil YJ, McCaffrey TV, Vale F, Freeman TB, Padhya TA. Otolaryngologic management of delayed pharyngoesophageal perforation following anterior cervical spine surgery. *Laryngoscope*. 2010 May;120(5):930-6. doi: 10.1002/lary.20747.
2. Kapu R, Singh M, Pande A, Vasudevan MC, Ramamurthi R. Delayed anterior cervical plate dislodgement with pharyngeal wall perforation and oral extrusion of cervical plate screw after 8 years: a very rare complication. *J Craniovertebr Junction Spine*. 2012 Jan;3(1):19-22. doi: 10.4103/0974-8237.110121
3. Rama-López J, Tomás-Fernandez M, García-Garza C, Martínez-Madrigal M. Pharyngeal perforation after anterior cervical spine surgery treated by transoral

endoscopic surgery. *Head Neck*. 2018 Feb;40(2):E13-E16. doi: 10.1002/hed.25030.

4. Geyer TE, Foy MA. Oral extrusion of a screw after anterior cervical spine plating. *Spine (Phila Pa 1976)*. 2001 Aug 15;26(16):1814-6. doi: 10.1097/00007632-200108150-00019.

5. Lee JS, Kang DH, Hwang SH, Han JW. Oral extrusion of screw after anterior cervical interbody. *J Korean Neurosurg Soc*. 2008 Oct;44(4):259-61. doi: 10.3340/jkns.2008.44.4.259

6. Quadri SA, Capua J, Ramakrishnan V, Sweiss R, Cabanne M, Noel J. et al. A rare case of pharyngeal perforation and expectoration of an entire anterior cervical fixation construct. *J Neurosurg Spine*. 2017 May;26(5):560-566. doi: 10.3171/2016.10.SPINE16560.

7. Sharma RR, Sethu AU, Lad SD, Turel KE, Pawar SJ. Pharyngeal perforation and spontaneous extrusion of the cervical graft with its fixation device: a late complication of C2-C3 fusion via anterior approach. *J Clin Neurosci*. 2001 Sep;8(5):464-8. doi: 10.1054/jocn.2000.0826.

8. Newhouse KE, Lindsey RW, Clark CR, Lieponis J, Murphy MJ. Esophageal perforation following anterior cervical spine surgery. *Spine (Phila Pa 1976)*. 1989 Oct;14(10):1051-3. doi: 10.1097/00007632-198910000-00004.

9. Wong DT, Fehlings MG, Massicotte EM. Anterior cervical screw extrusion leading to acute upper airway obstruction: case report. *Spine (Phila Pa 1976)*. 2005 Nov 15;30(22):E683-6. doi: 10.1097/01.brs.0000186861.82651.00.

10. Yin DH, Yang XM, Huang Q, Yang M, Tang QL, Wang SH. et al. Pharyngoesophageal perforation 3 years after anterior cervical spine surgery: a rare case report and literature review. *Eur Arch Otorhinolaryngol*. 2015 Aug;272(8):2077-82. doi: 10.1007/s00405-014-3483-7

11. Woolley SL, Smith DR. Pharyngeal perforation: A late complication of cervical spine surgery. *J Laryngol Otol*. 2005 Nov;119(11):913-6. doi: 10.1258/002221505774783386.

12. Moletta L, Pierobon ES, Salvador R, Volpin F, Finocchiaro FM, Capovilla G. et al. Pharyngo-esophageal perforation following anterior cervical spine surgery: a single center experience and a systematic review of the literature. *Global Spine J*. 2022 May;12(4):719-731. doi: 10.1177/21925682211005737