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Innocuous expectoration of an anterior C3 loosened screw—case report and literature review about a benevolent evolution with no esophageal injury

Gerson Reyes Rodriguez
The American Cowdray, ABC Medical Center, Santa Fe Campus, CDMX, dr.reyesgerson27@hotmail.com

José Alberto Israel Romero Rangel
The American Cowdray, ABC Medical Center, Santa Fe Campus, CDMX

See next page for additional authors

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Abstract

The anterior cervical discectomy and fusion (ACDF) technique is the gold-standard treatment for myeloradiculopathy. We present the case of a seventy-five years old female who came to revision because of worsening solids dysphagia, dry cough, and foreign body sensation in the past two weeks; we had practiced her an ACDF procedure four years ago. She denied presenting neurological deficit or neck pain. The physical examination was normal. Cephalic migration of the left C3 screw was evident on cervical plain and dynamic films and CT-Scan. She was admitted to the hospital for an upper gastrointestinal endoscopy that visualized retropharyngeal ulceration. Thirty minutes before surgery, she presented a spontaneous cough reflex and expelled the screw through her mouth; An esophagogram with a swallow of Bario showed no leakage of the contrast medium. She was under hospital surveillance for five days with prophylactic parenteral nutrition, progressing to a soft diet and later a regular diet. She was discharged home without a new surgery.

Cervical screw loosening has been reported as a rare complication, either due to poor placement or due to the patient's osteoporosis. This case report describes an innocuous spontaneous expectoration of a C3 loosened screw and the diagnostic, therapeutic approach we carried after this event.

Visual Abstract

Keywords

Anterior cervical discectomy and fusion (ACDF), hardware migration, hardware complications, cervical spine surgery

Authors

Gerson Reyes Rodriguez, José Alberto Israel Romero Rangel, Manuel Soto García, Manuel Rodriguez Garcia, Victor David Lopez Garcia, Iris Tatiana Montes González, and José Antonio Soriano Sánchez

Innocuous Expectoration of an Anterior C3 Loosened Screw—Case Report and Literature Review About a Benevolent Evolution with No Esophageal Injury

Gerson Reyes Rodriguez [a], José Alberto Israel Romero Rangel [a], Manuel Soto García [a], Manuel Rodriguez Garcia [b], Victor David Lopez Garcia [a], Iris Tatiana Montes González [a,*], José Antonio Soriano Sánchez [c]

[a] Neurosurgeon at the American Cowdray, ABC Medical Center, Santa Fe Campus, CDMX
[b] Orthopedic Surgeon at the American Cowdray, ABC Medical Center, Santa Fe Campus, CDMX
[c] Neurosurgeon and Chief of the Spine Clinic at the American Cowdray, ABC Medical Center, Santa Fe Campus, CDMX

Abstract

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Cervical screw loosening has been reported as a rare complication, either due to poor placement or due to the patient's osteoporosis. This case report describes an innocuous spontaneous expectoration of a C3 loosened screw and the diagnostic, therapeutic approach we carried after this event.

Keywords: Anterior cervical discectomy and fusion (ACDF), Hardware migration, Hardware complications, Cervical spine surgery

1. Introduction

The Anterior cervical discectomy and fusion (ACDF) is the gold standard for treating myeloradiculopathy. Its main indications are anterior compression vector, lower than three segments compromise, loss of cervical lordosis, disc-osteophyte complex, and ossification of the posterior longitudinal ligament [1–4, 12–14]. It allows a direct decompression, arthrodesis stabilization, lengthening of the cervical spine, and even more significant neurological improvement in the following five years after surgery [22,23]. Early complications include postoperative dysphagia, hematoma, dural tear, recurrent laryngeal nerve injury, Horner's syndrome, and esophageal perforation. Late complications to consider are hardware failure, pseudoarthrosis, and even hardware migrations [5–8].

There are reports on cervical screw loosening among the rarest complications that tend to happen in the mediate term due to poor placement or osteoporosis. Moreover, even a single report of a C2–C3 entire construct expectoration exists [9]. This case report describes a C3 loosened screw innocuous spontaneous expectoration, the diagnostic and therapeutic approach we carried out after this event.

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* Corresponding author. Neurosurgeon, Fellow Minimally Invasive Surgery, Spine Clinic, Neurological Center, ABC Campus Santa Fe Medical Center, Mexico City, Clinica Imbanaco, Cali, Clínica Cristo Rey, Cali, Colombia.
E-mail addresses: Dr.reyesgerson27@hotmail.com (G. Reyes Rodriguez), iris.montes787@gmail.com (I.T.M. González).

2. Representative case

We present the case of a seventy-five years old female who came to revision in June 2020 because of worsening solids dysphagia, dry cough, and foreign body sensation in the past two weeks; we had practiced her an ACDF procedure four years ago (Fig. 1).

She denied presenting neurological deficit or neck pain. The physical examination showed no pain on active movements of the cervical spine; his strength was symmetrical in 4 extremities, without sensory alterations or abnormal reflexes. Cephalic migration of the left C3 screw was evident on cervical plain and dynamic films and CT-Scan. The remaining C3–C7 cervical construct demonstrated intervertebral fusion, preserved lordosis, and no neural compression. The screw was located in the retropharyngeal space at the glottis level in the sagittal plane and behind the medial and inferior pharyngeal constrictor muscle. She was admitted to the hospital for an upper gastrointestinal endoscopy that rule out esophageal perforation, reporting epiglottis ulceration and non-erosive gastritis. She was scheduled for revision cervical spine surgery to remove the screw in the evening shift. Thirty minutes before surgery, she presented a spontaneous cough reflex and expelled the screw through her mouth with no bleeding traces in the screw or the oropharynx (Fig. 2). An esophagogram with a swallow of Bario showed no leakage of the contrast medium. We observed a hypointense halo in a new CT scan where the cervical screw was previously hosted (Fig. 3). She was under hospital surveillance for five days with prophylactic parenteral nutrition because of a lack of scientific evidence in this context; later, she started a liquid diet with progression to a soft diet and later a regular diet without other symptoms. She was discharged home without a new surgery (Fig. 4 Timeline of events).

Abbreviations

ACDF	Anterior Cervical Discectomy and Fusion
C	Body of the corresponding cervical vertebrae
MRI	Magnetic Resonance Imaging
CT	Computed Tomography

3. Discussion

The anterior cervical discectomy and fusion (ACDF) is a surgical procedure, first described by Smith and Cloward in 1955, performed widespread globally [1,10]. Cervical spinal surgery treats various pathologies such as spondylosis, neoplasms, infections, and trauma [11]. Complications for anterior cervical approaches range between 1.6 and 31.3% of the cases, including neurological, vascular, esophageal injury, dysphagia, dysphonia, respiratory distress, implant-related complications, adjacent segment degeneration, cerebrospinal fluid leakage, infection, and Horner's syndrome [12–14,24,25]. Cervical screw loosening has been reported as a rare complication due to poor placement or to the patient's osteoporosis. Pharyngoesophageal perforations can occur intraoperatively, perioperatively, or several years later, with a low incidence of 0.25%–1.49% [13,14].

The esophageal lesion presents in 0.3%–4% and is considered an early complication when it appears 30 days after surgery and late after this period. Plaque or screw migration is the most common cause of late esophageal injury, with mortality ranging from 7% to 27–60% when the diagnosis is late. Screw migration as a late complication has been reported

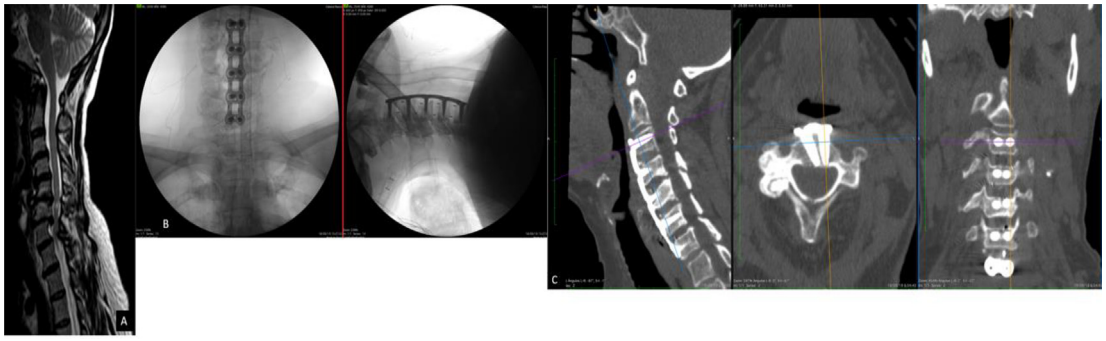

Fig. 1. Image A shows the initial MRI before anterior cervical instrumentation that was performed due to cervical spondylotic myelopathy from C3–C7. Image B shows the final construct and realignment of the cervical lordosis in the projections AP and lateral postoperative. Image C shows the cervical spine simple tomography in the bone view where the proper placement of the C3 cervical screws in multiplanar reconstruction is observed.

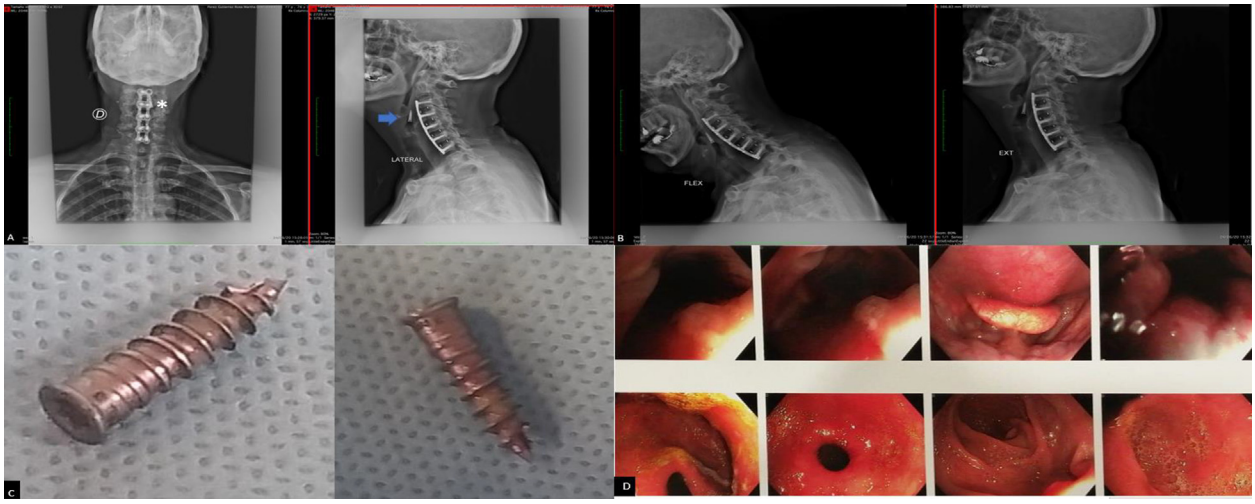

Fig. 2. Image A, the migration of the cephalic left cervical screw is observed in the anteroposterior projection radiograph shown in figure | , and in the lateral radiography, the migration of the screw is mainly in the retropharyngeal space of 5 mm shown on the arrow. Image B shows the dynamic films in flexion and extension, demonstrating construct fixation with no instability. Image C shows the cervical screw spontaneously expelled through the upper airway 30 without leaving any clinical sequelae. Finally, figure D shows endoscopy images without perforation of the hypopharynx and esophageal walls is observed.

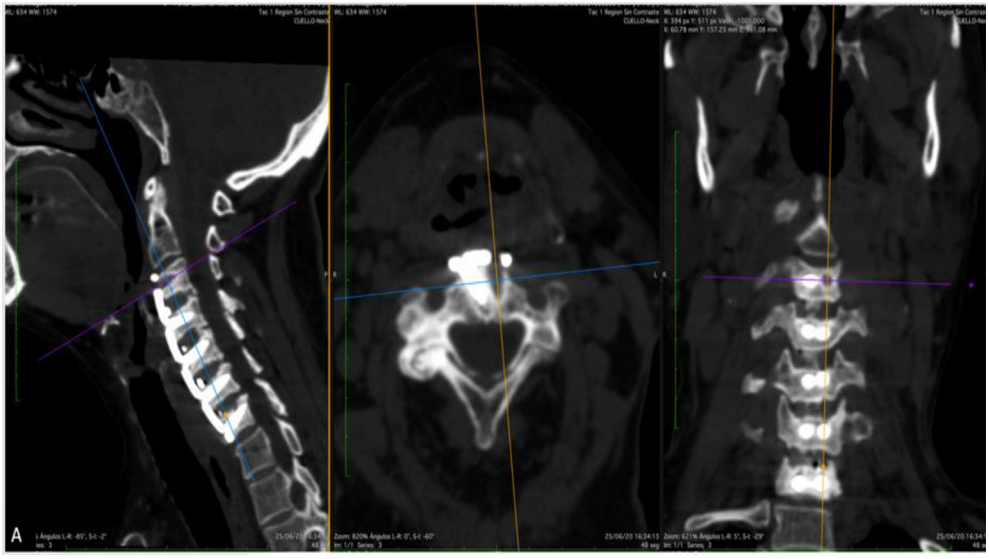

Fig. 3. Image A shows a multiplanar reconstruction with the absence of the left C3 cervical screw after the expulsion of the screw.

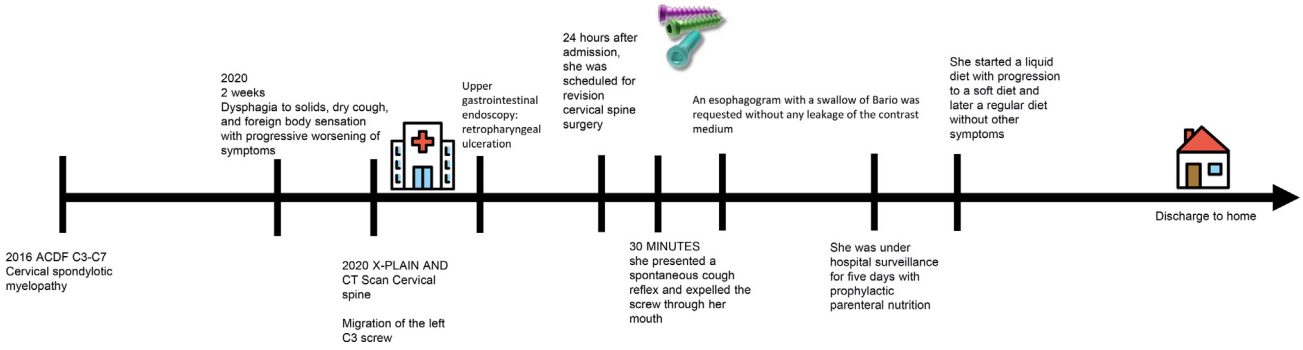

Fig. 4. Timeline of the events.

in up to 35% of cases, considered the most common cause of pharyngoesophageal injury secondary to cervical fusion. Esophageal perforation is the primary concern about spontaneous hardware expulsion. The proposed mechanisms for esophagopharyngeal perforation are pressure ulcers caused by the metal implant microtrauma. Chronic compression of the posterior pharyngoesophageal wall either by bone or the fixation device leads to focal ischemia, resulting in an esophageal perforation. The literature has some cases of loosened screws found in the gastrointestinal tract without evidence of scarring or ulcers. In such cases, the esophageal perforation has probably healed without clinical complication. Therefore, we must consider the loosening of anterior cervical screws a risk factor for esophageal perforation. Migration of the screw or construct parts in the cervical region can lead to hardware aspiration, mediastinitis, and even dead [5–7,15–17].

Concerning the innocuous expulsion presented in our case, we would like to mention some anatomical considerations that might have helped for a harmless passage of the screw. One key anatomical aspect is the Killian's triangle, which is formed by the union of the lower border of the inferior pharyngeal constrictor muscle and the superior border of the cricopharyngeal muscles. This region is usually anterior to the C5–C6 disc space and, on certain occasions, more cranial. It is mainly a weak area of the esophageal wall with a high predisposition to form Zenker's diverticula. This thin oropharyngeal layer separates the retropharyngeal space from the esophagus [18], allowing surgical retraction injuries. Nevertheless, in our case, we consider that this relationship of the Killian's triangle anatomy provided an esophageal harmless expulsion corridor for the screw to go through.

Our case highlights the lack of symptoms; the patient only had mild dysphagia for two weeks before spontaneous expectoration.

Many authors have reported their experience in late pharyngoesophageal perforations with hardware failure and spontaneous healing. Spontaneous healing may result from the small size of the displaced instrument or its slow postoperative migration. For example, Xing found that screws loosened by 2–5 mm can be managed conservatively with a cervical collar for three months to attain fusion. However, migration of more than 5 mm of the screws is associated with a high risk of injury to neighboring structures [19,20].

Asymptomatic patients without any infection around the perforated site often heal spontaneously and do not require surgical treatment. Therefore, after conducting this review of the medical literature, we encourage surgeons to be aware of Killiam's triangle anatomy, representing a passage through which migrated devices can go through the airway and be expelled, given its thin wall nature. We also consider that ulceration occurred in the hypopharynx through the Killiam's triangle and not in the esophagus wall below C5, which is also probable for the case report of a complete expulsion of the C2–C3 hardware.

It is mandatory always to carry out relevant studies such as simple cervical spine tomography, cervical MRI, and barium esophagram to rule out any complication that may increase mortality in a patient with this type of pathology. It could be an anatomical protective factor for only giving medical management to these patients and knowing that pharyngeal perforations can also occur and are more benign than esophageal perforations. Any migrated device beyond 5 mm in length in the cervical region must have revision surgery to avoid complications such as mediastinitis, esophageal perforation, or even dead [21].

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4. Conclusions

Spontaneous innocuous expectoration of a cervical screw is not frequently observed and can be challenging for decision-making both for the patient and the surgeon for its conspicuous appearance. A benevolent course can often be expected for hardware migrating from C3–C5 levels due to Killian's triangle avascular anatomy. Nevertheless, all the patients must be provided with diagnostic tests to rule out complications, including esophageal perforation.

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