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# Acta Otorrinolaringológica Gallega

## Caso Clínico

### Prevertebral space abscess managed with minimally invasive image-guided drainage

### Absceso del espacio prevertebral tratado con drenaje percutáneo guiado por imagen

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### Abstract

Introduction: The prevertebral space is one of the deep spaces of the neck, extending from the skull base to the coccyx. Infection of the vertebral bodies, penetrating trauma injuries and tuberculous abscess, among other conditions, may affect this anatomical space. Prevertebral abscess forms less than 1% of all deep neck infections.

Case summary: The authors present the case of a male patient with mild odynophagia, low-grade fever and neck pain. Complementary imaging studies showed a collection located in the prevertebral space. Drainage of this abscess was performed using an imaging guided-technique, with complete imagiologic and symptomatic resolution.

Discussion: Prevertebral space infections may present with minor symptoms and apparently unremarkable physical examination findings. Additional investigation with imaging techniques is of utmost importance in identifying these infections and extent of dissemination. Conservative management strategies using percutaneous needle aspiration, as an alternative to surgical incision and drainage, allow successful treatment in selected cases. Infections of the prevertebral space may pose significant difficulties in diagnosis and timely treatment. A high index of sus-

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picion is necessary to properly identify the patients presenting with this particular deep neck space infection.

**Keywords:** Prevertebral space, deep neck infections, prevertebral abscess

### **Resumen**

**Introducción:** El espacio prevertebral es uno de los espacios profundos del cuello, que se extiende desde la base del cráneo hasta el cóccix. La infección de los cuerpos vertebrales, las lesiones traumáticas penetrantes y el absceso tuberculoso, entre otras afecciones, pueden afectar este espacio anatómico. El absceso prevertebral forma menos del 1% de todas las infecciones profundas del cuello.

**Descripción:** Los autores presentan el caso de un paciente masculino con odinofagia leve, fiebre baja y dolor de cuello. Los estudios de imagen complementarios mostraron una colección ubicada en el espacio prevertebral. El drenaje de este absceso se realizó utilizando una técnica guiada por imagen, con resolución completa de imágenes y síntomas.

**Discusión:** Las infecciones del espacio prevertebral pueden presentarse con síntomas menores y hallazgos aparentemente normales en el examen físico. La investigación adicional con técnicas de imagen es de suma importancia para identificar estas infecciones y el grado de diseminación. Las estrategias conservadoras de manejo con aspiración con aguja percutánea, como alternativa a la incisión quirúrgica más el drenaje, permiten un tratamiento exitoso en casos seleccionados. Las infecciones del espacio prevertebral pueden presentar dificultades significativas en el diagnóstico y tratamiento oportuno. Se necesita un alto índice de sospecha para identificar adecuadamente a los pacientes que presentan esta infección particular del espacio profundo del cuello.

**Palabras Clave:** Espacio prevertebral, abscesos profundos de cuello, absceso prevertebral

### **Introduction**

Deep neck space infections (DNSI) remain, in our days, a potentially life-threatening illness in both children and adults. In spite of the reduction in its incidence due to advances in antimicrobial treatment, DNSI are still one of the most serious emergencies in otolaryngology practice, due to the risk of airway complications and extension to vital structures.

The cervical spaces are delimited by fascial compartments upon which lie the muscles and neck structures. The knowledge of the complex anatomy of the cervical spaces allows to determine the probable origin of a DNSI and its most likely pattern of dissemination.

The prevertebral space (PVS) is a potential space, defined anteriorly by the prevertebral fascia and posteriorly by the vertebral bodies. It lies posteriorly to the danger space and extends from the skull base superiorly to the coccyx inferiorly<sup>1</sup>. The PVS contains several prevertebral and paraspinal muscles; the brachial

plexus and phrenic nerve; and both vertebral artery and vein. Infections of the PVS may be caused by local extension or hematogenous spread of upper respiratory tract, odontogenic or skin infections, penetrating trauma to the posterior pharynx, postoperative infection, infectious spondylodiscitis or secondary spread from tuberculous abscess (Pott's disease)<sup>2,3</sup>. Although a number of conditions that compromise the immune system (such as rheumatoid arthritis, chronic steroid use, *diabetes mellitus* or HIV) increase the susceptibility for DNSI, prevertebral space infection is relatively uncommon and accounts for 1%-3.8% of all DNSI<sup>4,5</sup>.

### Case Report

A healthy 38-year-old man presented to the otorhinolaryngology emergency service of our hospital with a four-day history of mild odynophagia and neck pain. There were no complaints of dysphagia, breathing difficulty, dysphonia, aspiration, purulent cough or hemoptysis. Apart from low-grade fever (38.2°C) and mild discomfort in the mobilization of the neck, the ENT physical examination was normal. Brief neurological exam was unremarkable. Upon inquiry, he reported the ingestion of a fishbone about two weeks before.

Despite the absence of a neck mass, foreign body or lesion in the larynx, a cervical ultrasound (US) was requested and showed a discrete phlegm at the level of the thoracic inlet, behind the carotid space. Blood tests revealed leukocytosis (14030/ $\mu$ L, reference range: 3800-10600/ $\mu$ L) with neutrophilia (11880/ $\mu$ L, reference range: 1300-8800/ $\mu$ L) and increased C-reactive protein (20.88mg/dL, reference range: 0-0.5mg/dL). A complementary cervical computed tomography (CT) and magnetic resonance imaging (MRI) showed a collection of 37x38x19mm with contrast-enhanced walls and gas bubbles localized in the prevertebral space, at the level of the first thoracic vertebra, which suggested an infectious collection (Figure 1). Esophagoscopy reported no abnormal findings, except for a smooth bulge in the proximal esophageal wall.

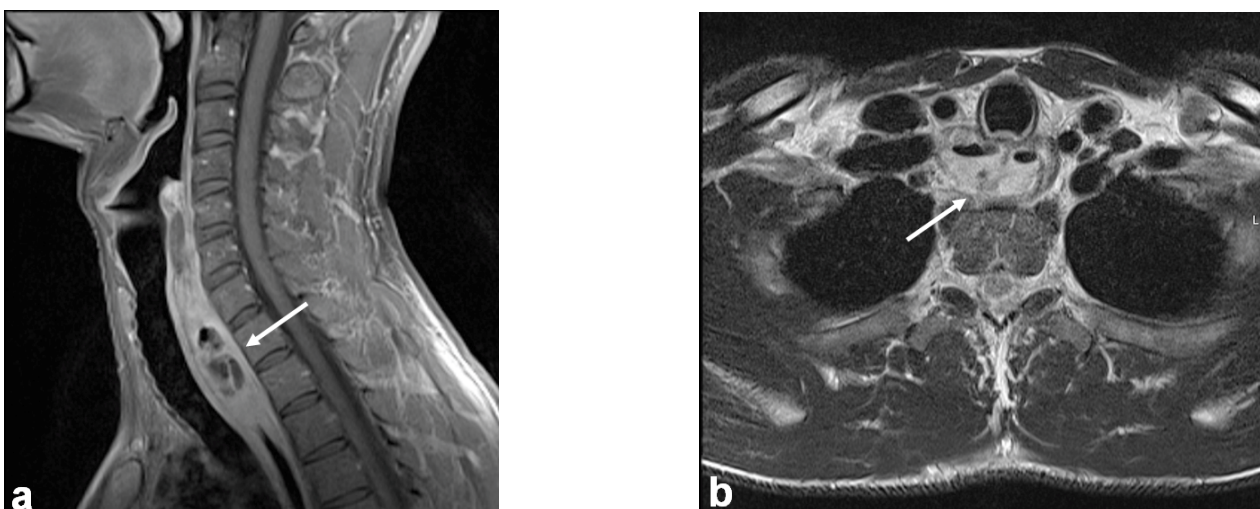


Figure 1: (a) Sagittal and (b) axial view of contrast-enhanced cervical MRI showing a prevertebral abscess with 37x38x19mm at the level of the first thoracic vertebra (arrows).

Percutaneous US and CT-fluoroscopy guided drainage of this prevertebral abscess was performed with recovery of a purulent exudate (Figure 2, a-d). A pig-tail drain was left in place for three days (Figure 2, e-f). No pathogenic organism was identified on the drain cultures. Intravenous antimicrobial empiric therapy with ceftriaxone plus clindamycin was maintained for fourteen days, with complete imagological (Figure 3) and symptomatic resolution.

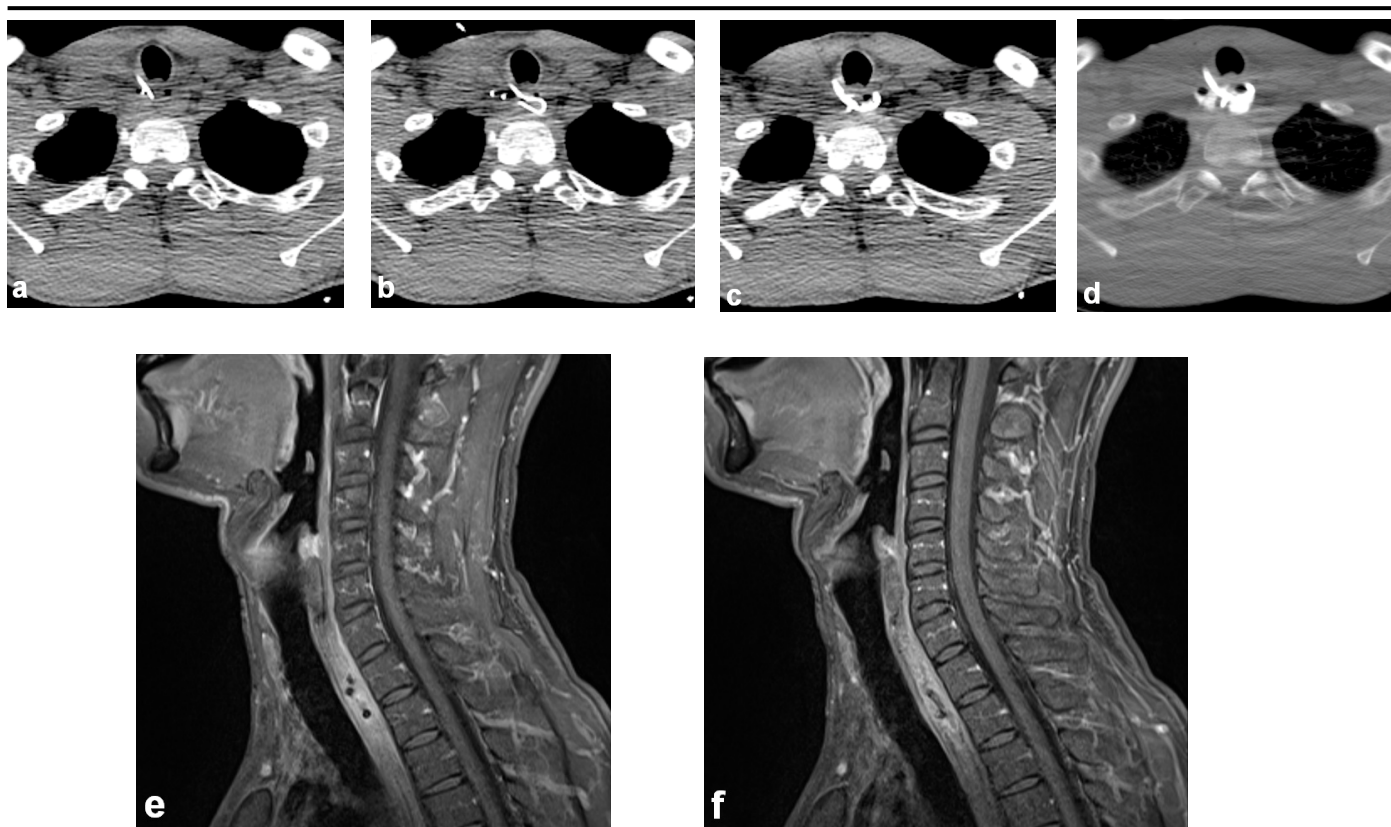


Figure 2: (a, b, c) Axial views of percutaneous CT-fluoroscopy guided drainage of the prevertebral abscess using Seldinger technique. A 10-french pig-tail drain was used to perform an abscessogram with no evidence of leakage of contrast medium to the esophagus (d). Sagittal views of pig-tail drain *in situ* after drainage of the abscess (e, f).

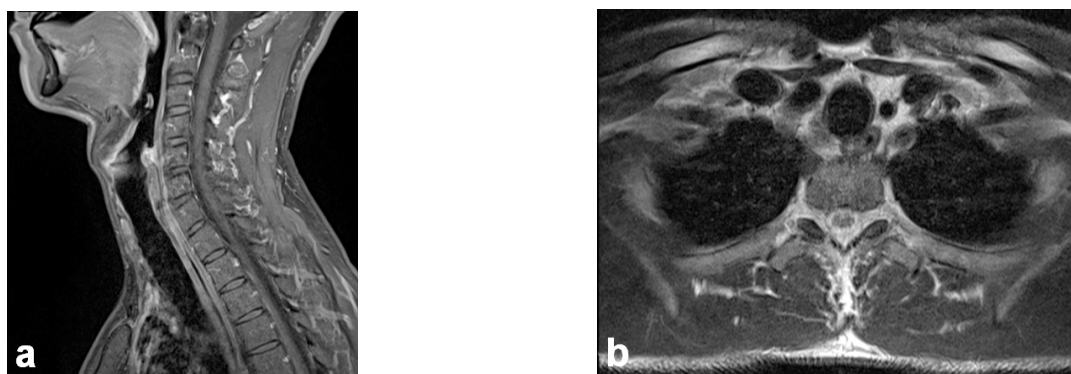


Figure 3: (a) Sagittal and (b) axial view of cervical MRI performed at one month follow-up without evidence of infectious collection.

## **Discussion**

The PVS extends throughout the entire length of the neck and its infection is associated with nonspecific complaints, namely neck, back, or shoulder pain particularly with swallowing, limited range of motion of the neck, and dysphagia. Physical examination may be normal or reveal a midline bulge in the oropharynx and hypopharynx<sup>6</sup>.

In a retrospective review of eleven patients with prevertebral disease observed by a head and neck specialist, the most common presenting signs included neck pain, odynophagia, dysphagia, neck rigidity, fever, and back pain. Using fiberoptic examination, a bulge on the posterior pharyngeal wall was observed in half the cases<sup>7</sup>.

These relatively mild symptoms and apparently unremarkable clinical findings increase the risk of misdiagnosis. Therefore, the presence of dysphagia, intense odynophagia, and fever should alert the clinician for the possibility of a prevertebral infection and mandate further investigation, as was done in our clinical case.

Imaging techniques are the key in defining the origin, presence of complications and size of DNSI. For the purpose of preliminary investigation, ultrasound has been used to assess the presence of an abscess<sup>3</sup>. However, the use of computed tomography with contrast is paramount in determining the source and extent of dissemination of DNSI<sup>4</sup>. Magnetic resonance imaging is useful for the precise evaluation of soft tissue involvement<sup>3</sup>. In our case, the finding of a discrete phlegm at the level of the thoracic inlet with cervical US was further complemented with cervical CT, which was impaired by numerous artefacts due to surrounding bony structures. For better imagiologic assessment, a cervical MRI with contrast was performed, which revealed an infectious collection in the prevertebral space, at the level of the first thoracic vertebra.

Regarding the treatment strategies for prevertebral space infections, surgical incision and drainage followed by antimicrobial therapy as been the traditional approach for these cases<sup>2</sup>. If open surgical drainage is performed, a long incision is necessary to allow continuous pus drainage and tracheotomy may be undertaken to secure the airway. On top of the remaining disfiguring neck scar, the morbidity related with the open neck wound<sup>8</sup> stressed the need of conservative management strategies such as needle aspiration<sup>9,10</sup> or catheter drainage<sup>11</sup>.

Using percutaneous needle aspiration, Brodsky managed to successfully treat 80% of uniloculated neck abscesses in children<sup>9</sup>. In a prospective trial, Yeow treated a series of uniloculated neck abscesses using US-guided percutaneous needle aspiration or US-guided catheter drainage under local anesthesia<sup>12</sup>, avoiding the need of open surgical intervention in 87% of cases. In a randomized controlled trial of surgical versus ultrasound drainage, Biron showed that US-guided drainage allowed significant cost reduction, due to reduced length of hospital stay and savings in terms of staffing and instrumentation<sup>13</sup>. The use of CT-guided technique for aspiration of cervical abscesses as also been reported, as an adjuvant to incision and drainage<sup>14</sup> or as the definite treatment method<sup>10,15</sup>. Although technically challenging, due to the proximity to vital organs and vessels in the neck, percutaneous US and CT-fluoroscopy guided drainage was performed in our case, allowing the recovery of exudate for culture and placement of a pig-tail drain.

## **Conclusion**

Infections of deep neck spaces include a large spectrum of diseases with variable severity, which may present with relatively minor complaints or ominous signs of airway compression, descending cervical mediastinitis or sepsis.

Particularly, prevertebral infectious conditions, due to their anatomic contiguity to the retropharyngeal and danger spaces, can be associated with significant delays in the precise localization of the infection and subsequent postponement of adequate treatment. In otorhinolaryngology practice, patients presenting with neck pain and limited range of motion, dysphagia and fever should raise the suspicion for prevertebral infection.

This case reports an infrequent but potentially dangerous abscess located in the prevertebral space, with relatively minor complaints. A high index of suspicion allowed an early diagnosis and management using minimally-invasive image-guided therapeutic approach with total recovery.

**Disclosure of interest:** The authors declare that they have no competing interest.

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