

# Intercostal Neurinoma: A Rare Cause of Persistent Thoracic Pain

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## Abstract

Persistent thoracic pain with no history of trauma demands diagnostic workup. In this case, the patient complained of right thoracic continuous belt-like pain, sometimes experienced as shooting pain, over several months. The symptoms were first treated conservatively with painkillers, which was rather ineffective. A magnetic resonance imaging scan of the thorax surprisingly showed an unclear piston-like enlargement near the seventh rib closely above the spinal canal. Video thoracoscopy was performed to provide further clarification. This showed two lesions of the intercostal nerves of the seventh and eighth ribs. The intercostal nerves were resected in these areas. Histological examination revealed two neurinomas of the intercostal nerves with focal outgrowth of a neural cyst measuring 1.6 cm on the seventh intercostal nerve. The patient was free of any pain after the operation.

## Keywords

- ▶ thoracic surgery
- ▶ chest wall
- ▶ thoracoscopy/VATS

## Background

Peripheral neurogenic tumors originating from the intercostal nerves are extremely rare. The incidence is below 10% of all primary neurogenic thoracic tumors.<sup>1</sup> These neurogenic tumors can be either benign or malignant. They include heterogeneous types of tumors such as fibromas, malignant neurilemmomas, paraganglionic tumors, and primitive neuroectodermal tumors. These tumors are often entirely asymptomatic and are discovered incidentally during imaging of the thorax for other reasons. In the present case, the patient had symptoms and was found to have two synchronous intercostal neurinomas.

## Case Report

A 59-year-old man complained about right thoracic pain in the shape of a belt at the level of the seventh and eighth ribs. The pain had been present for several months. The patient also experienced repeated shooting pains. The pain began spontaneously and without known trauma. No other signifi-

cant comorbidity was present. The thoracic pain had previously been treated with strong painkillers, to which the patient had already adapted. At the time of admission, the patient was in a good general and nutritional state. There has been no weight loss in the preceding months. The physical examination was unremarkable. A magnetic resonance imaging (MRI) scan of the thorax showed an unclear piston-shaped enlargement in the area of the seventh rib (see ▶Fig. 1). This enlargement was radiomorphologically suspicious for a cyst. No other abnormalities were visible on the scan. In particular, this cyst-like formation had no contact with the spinal canal. Video thoracoscopy was performed to provide further clarification. During surgery, piston-shaped distensions of the intercostal nerves were found in the area of the seventh and eighth ribs above the point at which these nerves leave the spinal canal (see ▶Fig. 2). There were no abnormalities of the other intercostal nerves. The pleura was opened in these area and the intercostal nerves were then exposed. A 2-cm length was resected from each intercostal nerve. Histologically, neurinomas were found on both

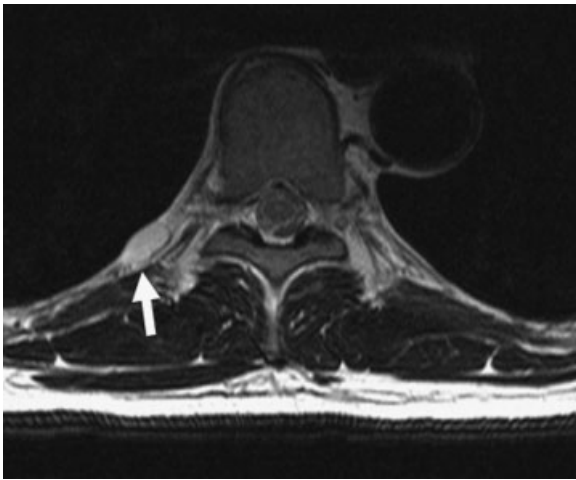
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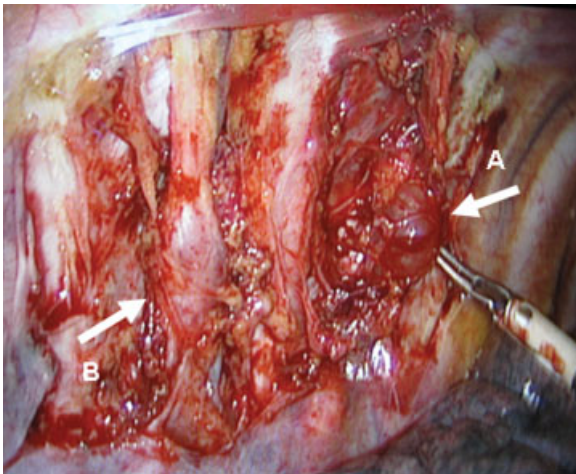
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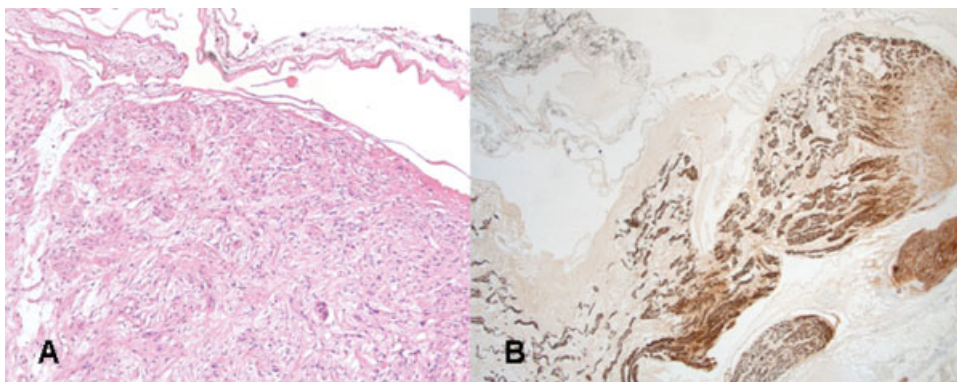




**Fig. 1** Cyst-like formation near the seventh rib; thoracic magnetic resonance scan (T2 weighting).



**Fig. 2** Video thoracoscopic finding on the seventh intercostal nerve and eighth rib: A: neural cyst, B: neurinoma of the eighth rib.



**Fig. 3** (A) Hematoxylin and eosin staining of the prepared intercostal nerves, benign neurinoma (enlargement: 10 × ) (B) immunohistochemistry staining (S100) of the neurogenic cyst with transition into the neurinoma on the right side (enlargement: 1.25×).

intercostal nerves. There was also focal growth of a 1.6-cm neural cyst in the area of the seventh intercostal nerve (see ► **Fig. 3**). The parietal pleura was also resected in these regions. It showed slight fibrotic changes. The postoperative course was uneventful and the patient was completely free of pain. The patient was discharged from the hospital on the 4th postoperative day. A regular follow-up was not initiated.

### Discussion

Chronic band-shaped thoracic pain can have various causes. In the absence of trauma, thoracic disk prolapse with compression of the spinal nerves is the most frequent cause of such symptoms. Neoplastic changes on the intercostal nerves are extremely rare. In a retrospective analysis of 149 intrathoracic neurogenic tumors,<sup>2</sup> the incidence was 3%. Thoracic pain is the leading symptomatic which gives cause of further diagnostics. These tumors form a heterogeneous group consisting of neurofibromas, schwannomas, paragangliomas, and malignant neurilemmomas. Only approximately 20 case reports are published in the literature.<sup>1</sup> Usually in a computed tomographic (CT) scan of the thorax, a solid or more cystic lesion in the intercostal space is seen. In this situation, a MRI of the thorax may be helpful for checking for a chest wall infiltration. In this case, only one small cystic change was apparent in the region of one intercostal nerve. When planning surgery, it is always necessary to establish whether the spinal canal is also affected. This was not the case in our patient. A CT-controlled fine needle biopsy can be useful to get an idea which type of tumor is present. In the literature, there were no alternative treatment options, for example, like ethanol injections or radiofrequency ablation described, the only treatment option is radical surgery. In our case, we decided to do a video thoracoscopy. It can be helpful for further diagnostic workup and treatment.<sup>3</sup> The extension and precise location of the pathology can be established with this procedure and the tumor can be removed completely during the same session, as in our case.<sup>4</sup> Morbidity is low in video-assisted thoracoscopic tumor resection.<sup>5</sup> However, it is

often impossible to separate the neurinoma from the intercostal nerve so that complete resection of the intercostal nerves is necessary as in this case. A neural cyst was also present in our case. It is interesting that two neurinomas occurred at the same time on two different intercostal nerves. Up to now, several schwannomas along one intercostal nerve have been described.<sup>6</sup> However, if the tumor is greater than 5 cm,<sup>2</sup> the risk for malignancy increases or there is a histological proof for malignancy, and only local removal of the tumor is not sufficient. The chest wall needs to be resected as well<sup>1</sup> to prevent local recurrence. If the tumor is histologically benign, follow-up is not necessary because the long-term prognosis is very good. Local recurrence has not been reported for neurinomas. Our patient was free from symptoms immediately after the operation. Pain medication was no longer given.

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