
症 例

Calcification of Spinal Cord Tumors: Report of Two Cases

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Summary

Two cases of calcification of spinal cord tumors were detected by computed tomography and magnetic resonance imaging. The first; a 27-year-old male, with a very rare astrocytoma accompanied by calcification of the thoracic spinal cord, and the second; a 62-year-old female, with a rare calcified neurilemmoma in the upper cervical extradural space. The purpose of this paper is to draw attention to the fact that some spinal cord tumors occasionally contain areas of calcification, and review the literature on this subject.

Introduction

Tumors of the spinal cord, especially those showing calcification are extremely rare. Our report deals with two such cases, astrocytoma and neurilemmoma, in which calcification was accurately diagnosed preoperatively using imaging techniques, such as computed tomography and magnetic resonance imaging.

Case Report

Case 1: 27-year-old male presented with gait disturbance. Weakness in the lower extremities appeared in December, 1979, causing the patient to limp. In July, 1981, he noticed decreased sensitivity in the right thigh, and began using crutches due to weakness of the right knee. In October, myelography performed at another hospital suggested a spinal cord tumor. He was admitted to our hospital for surgery on December 2nd. On admission, muscular atrophy in the right thigh, marked footdrop and pes cavus as well as spastic gait were observed. The deep tendon reflexes were exaggerated bilaterally, and Babinski's sign, as well as patellar and ankle clonus were observed on the right side. The cremasteric reflex was totally absent

Key words: Calcification, Spinal cord tumor, Astrocytoma, Neurilemmoma.

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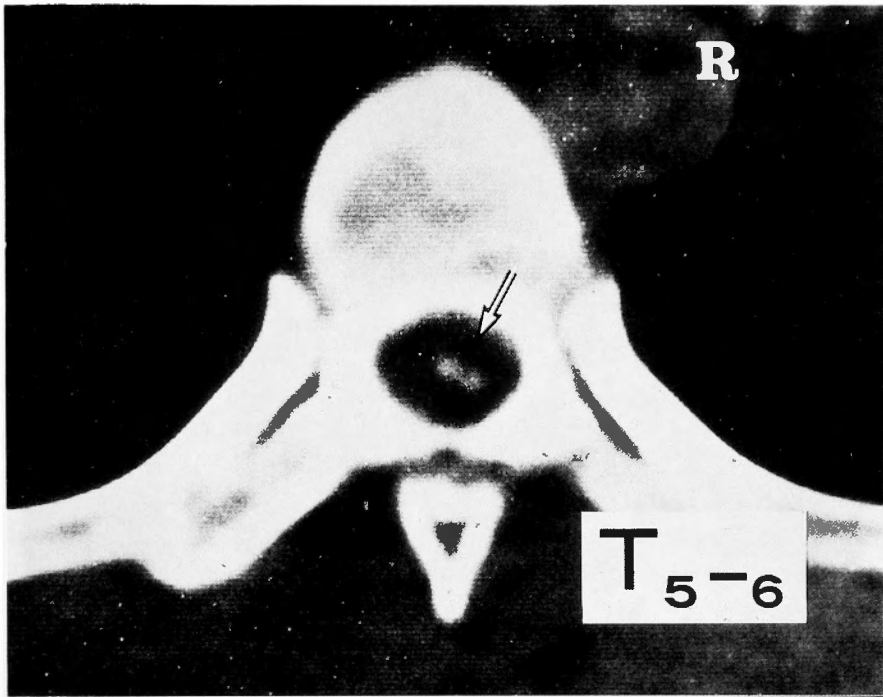


Fig. 1 Computerized tomographic metrizamide myelogram showing the spinal cord swelling and calcified core (arrow) at T5-T6.

on the right side, as was the lower abdominal reflex. A decreased sensitivity to pain and temperature was noted between T5-T10 on the right, as well as a loss of sensitivity to touch and vibration in the region below T9. Roentgenograms revealed moderate scoliosis of the thoracic spine and a widening of the inter-pedicular distance between T2 and T8. Myelography showed a marked swelling of the spinal cord from T1 to T8, while computed tomography after myelography revealed calcification, at the T5-T6 level (Fig. 1).

Laminectomy of the first to eighth thoracic vertebrae was performed, and on opening the dura, the cord was seen to be swollen from C2 to C7. After myelotomy from T4 to T7, as much as possible of the intramedullary tumor was removed. The resected tumor was dark brown to yellowish white in color, and contained two calcified cores. Histopathologically, a diagnosis of astrocytoma (Grade 1) was made. Post-operatively, the weakness in the lower extremities gradually disappeared and there is no sign of any recurrence.

Case 2: A 62-year-old female presented with a dull pain in the left nuchal region, which she first noticed in 1977. In 1980, she developed motor disturbance in her left hand, and then in 1983, repeated tinnitus aurium started to occur. She was admitted to our hospital on November 14, 1985. Roentgenograms and myelograms revealed marked enlargement of the intervertebral foramen at C1-C2 on the left side (Fig. 2). Computerized tomographic metrizamide myelography (Fig. 3), and magnetic resonance imaging (Fig. 4) showed an extradural, dumbbell-type tumor on the left side at the C1-C2 level, causing compression of the spinal cord. Cal-

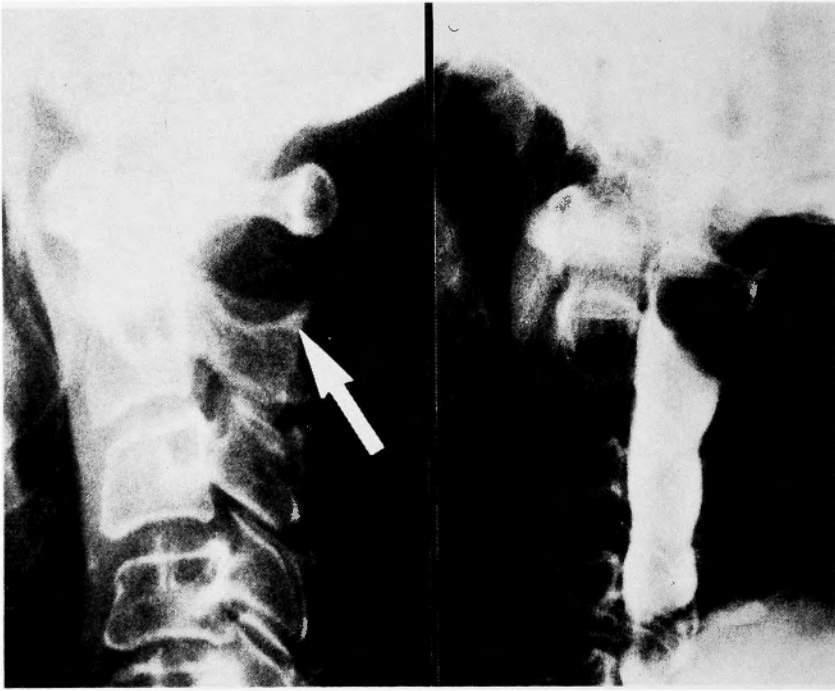


Fig. 2 Roentgenogram and myelogram showing marked enlargement of the intervertebral foramen (white arrow) at C1-C2, and spinal cord compression.

cified cores were also found within the part of the tumor protruding from the inter-vertebral foramen. Laminectomy of the first to second cervical vertebrae and total resection of the tumor, along with that portion of the dura to which it tightly adhered, was performed. Histopathologically, the specimen displayed the characteristics of Antoni type A neurilemmoma, having dense spindle-shaped cells and aggregates of palisading nuclei. The post-operative course was uneventful, and the patient's condition returned to normal, there being no further neurological symptoms.

Discussion

Advances in high-resolution computed tomography and magnetic resonance imaging, have made possible the definitive diagnosis of spinal cord lesions. Radiographic demonstration of calcification within spinal canal tumors is rare²⁾. The most common type of lesion showing calcification is the meningioma^{6,7,13,15)}, but calcification is also occasionally found in teratoma¹⁰⁾, angioma³⁾, glioblastoma⁹⁾, ganglioneuroma¹¹⁾ and hemangioma¹⁹⁾. Calcification associated with neurilemmoma^{2,4,7,11,18)} and astrocytoma⁵⁾, however, is an extremely rare condition. EPSTEIN⁵⁾ reported two children with intramedullary astrocytoma showing calcification, which was observed histologically but not radiographically. Our Case 1, is a very rare calcified thoracic spinal cord astrocytoma, discovered by computerized tomographic metrizamide myelography. KALAN⁸⁾

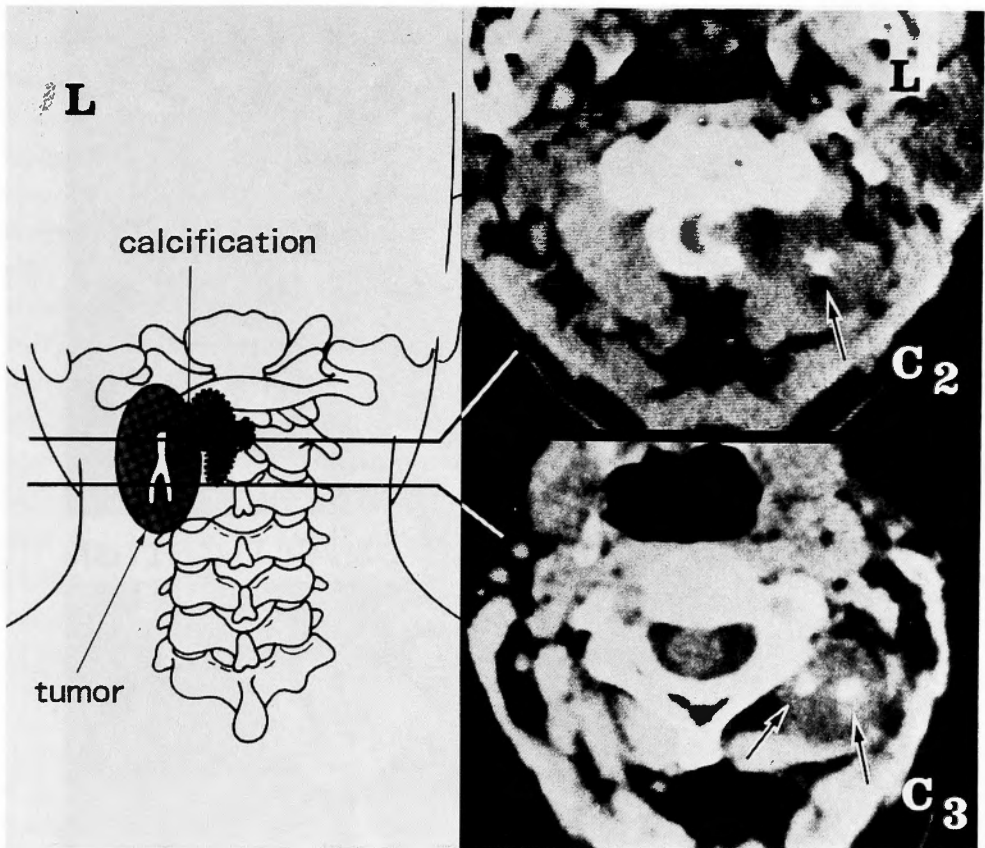


Fig 3 Illustration and computerized tomographic metrizamide myelogram showing an extradural dumbbell-type tumor on the left side at C2, C3, causing compression of the spinal cord. Calcified cores (arrows) were also found within the extraspinal canal tumor.

reported that calcified areas are usually present within gliomas having a benign histologic appearance. Furthermore, he showed that there was a longer interval between the development of clinical symptoms and surgery, in those cases with calcification, than for patients in whom it was not present. KUBOTA⁹ reported that for his case of glioblastoma, it was reasonable to assume that it was an originally benign astrocytoma manifesting areas of calcification.

The neurilemmoma is a slow growing, smoothly encapsulated tumor that may occur along a nerve root at any level of the craniospinal axis. Intradurally, it arises most frequently at the posterior nerve roots in the dorsal region¹⁶. Most of these tumors (67%) are intradural in location, with only 16% being entirely extradural¹⁷. Radiographically demonstrable calcification within spinal neurilemmoma is rare, and it has even been said that it does not occur^{11,17}. Histologically, spinal and intracranial neurilemmoma are similar, showing variable proportions of interwoven bundles of long, bipolar spindle cells (Antoni type A), and loose-textured tissue (Antoni type B). In addition to cyst formation, other known secondary changes include,

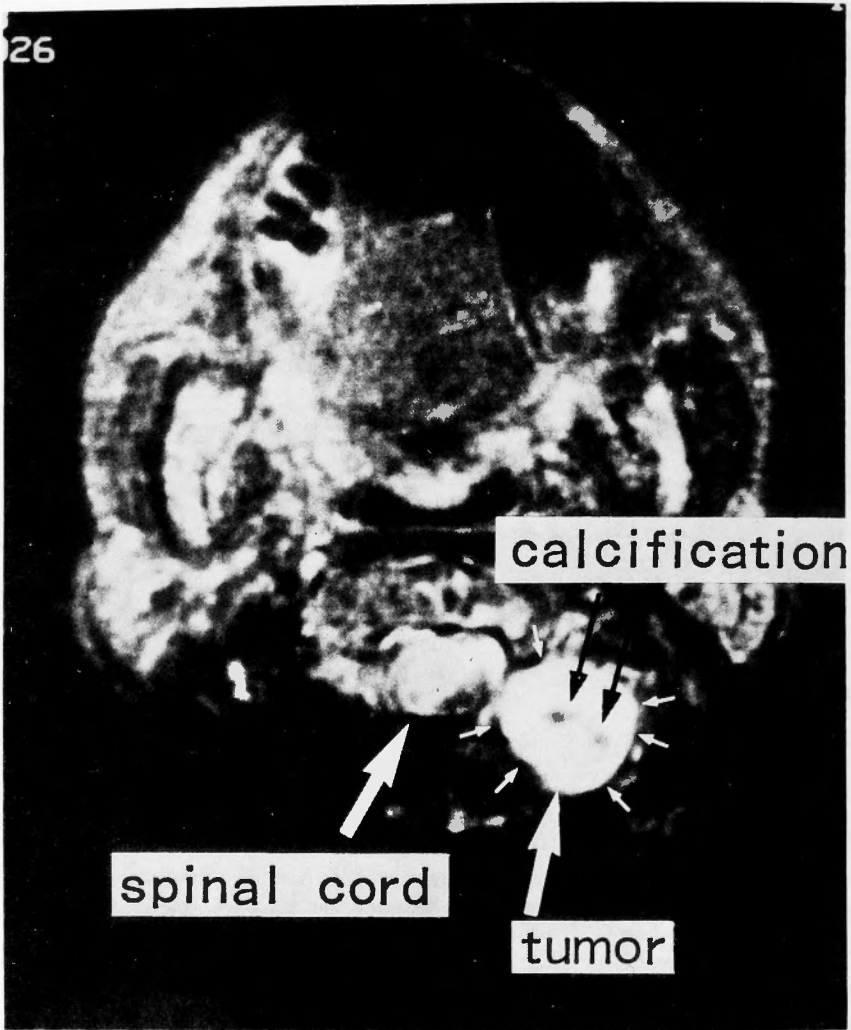


Fig. 4 Magnetic resonance image showing the tumor (surrounded by small white arrows), and calcified cores (black arrows) within it.

xanthomatous degeneration, vascular thrombosis, and dystrophic calcification¹⁶⁾. (Our case was Antoni type A, and was remarkable in that the tumor had centers of calcification.

GRAHAM⁷⁾ was the first to report calcification of a neurilemmoma, in the case of a patient with an intradural extramedullary tumor of the cauda equina. There was also a description of an extradural tumor in the cervical spine by BONSTELLE²⁾. These were both demonstrated histologically, but not radiologically. One case of radiographically demonstrable calcification of an intradural extramedullary neurilemmoma was reported by SHIMMEL¹⁸⁾. DROSS⁴⁾ reported the first case of a calcified, thoracic, extradural neurilemmoma, which he demonstrated by computed tomographic myelography. Our Case 2, is the first reported case of a calcified, cervical, extradural neurilemmoma as demonstrated by magnetic resonance imaging, and is

only the second report, to our knowledge, of tumor calcification within the cervical spine.

The mechanism underlying the formation of calcified areas within tumors of the central nervous system, is as yet not understood. MARTIN¹² divided patients with calcified intracranial neoplasms into four main categories, on the basis of their histological patterns: (1) calcifications within the blood vessel walls, in which small globules or calcospherites initially emerge within the adventitia or media of the small vessels; (2) calcium deposits in necrotic areas adjacent to blood vessels; (3) calcium salts in an area of old hemorrhage or necrosis; and (4) (a) calcific globules within tumor cells, (b) calcific changes within the stroma of the tumor or its capsule, or (c) calcific changes in the tumor periphery not related to types (a) or (b). He stated that pattern (1) is the most frequently encountered.

Ultrastructural studies of various tumors imply that areas of calcification originate from the mitochondria and or the matrix vesicles. KUBOTA⁹ also suggested, that calcifications in the blood vessels of the spinal cord gliomas, may derive from matrix vesicles or matrix giant bodies, and that they may be ascribable to degenerated cells within the blood vessel walls.

Our report deals with two rare cases of calcification in spinal cord tumors detected by computed tomography and magnetic resonance imaging. We hope that in future, computed tomography and magnetic resonance imaging will help to further delineate these faintly calcified spinal cord tumors, which cannot be seen on plain roentgenograms alone.

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和文抄録

石灰化を伴った脊髄腫瘍2例

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石灰化を伴う脊髄腫瘍は稀な疾患であり, 中でも画像診断にて石灰化を術前に確認し得た例は極めて稀である. 今回我々は術前画像診断にて石灰化を確認し得た脊髄腫瘍の2例を経験したので報告する.

症例1: 27才, 男性. 昭和54年12月より, 右下肢の脱力を覚え, 歩行障害をきたす様になった. 昭和56年10月より, 歩行障害が増悪した. Myelography, CTMにて髄内腫瘍を疑い, 昭和57年1月12日, 腫瘍摘出術を施行した. 病理組織診断は astrocytoma, grade Iであった.

症例2: 62才, 女性. 昭和52年に左項部の膨隆に気づいたが, 特に症状もなく放置していた. 昭和58年頃より, 難聴をきたす様になり, 昭和60年11月, CT, Myelography, CTM, MRIの結果, 頸髄の腫瘍と診断し, 昭和61年1月10日腫瘍摘出術を施行した. 病理組織診断は neurilemmomaであった.

石灰化を伴う脊髄腫瘍の報告は, 現在まで astrocytoma: 2例, neurilemmoma: 4例が見られるのみであり, 極めて稀なものである.