



# Hyperdense Plaques Ossificans of the Thoraco-Lumbo-Sacral Dura Mater Associated with Lumbar Spinal Stenosis: A Case Report

Zhang X, Ma P, Qiu P, Zheng C, He X\* and Lin W\*

Department of Spine Surgery, Affiliated Hospital of Guangzhou University of Traditional Chinese Medicine, China

## Abstract

Dural ossificans is a common chronic disorder that usually is found in the thoracolumbar spine. Sometimes it is associated with ossification of the ligamentum flavum, but the lesion region generally does not exceed three segments. These forms of spinal dural and arachnoid calcification within the spine are rarely associated with clinical symptoms. We describe a patient with hyperdense plaques ossificans of the thoraco-lumbo-sacral dura mater consistent with spinal stenosis.

**Keywords:** Dural ossificans; Hyperdense plaques; Spinal stenosis

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### \*Correspondence:

Xu He, Department of Spine Surgery, Affiliated Hospital of Guangzhou University of Traditional Chinese Medicine, No. 40 Jintang street, south Hongling Road, Shenzhen 518001, China, Tel.: +86-13537631577; Fax: +86-755-89458415;

E-mail: hexu989@163.com

Wenping Lin, Department of Spine Surgery, Affiliated Hospital of Guangzhou University of Traditional Chinese Medicine, No. 40 Jintang street, south Hongling Road, Shenzhen 518001, China, Tel.: +86-15919797722; Fax: +86-755-89458415;

E-mail: okoklwp@126.com

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## Introduction

Spinal Dural Ossificans (DO) is a relatively common entity in clinical practice, mostly observed radiographically or during surgery or autopsy. It is characterized by ossification within the dural membrane. Etiologically, it may be a result of spinal trauma, previous surgery, infection, or myelography. However, its true incidence or etiopathogenesis is still unknown. We describe a patient with thoraco-lumbo-sacral DO as well as Lumbar Spinal Stenosis (LSS). She did not receive spinal surgery, but conservative treatment, which included acupuncture, oral non-steroidal anti-inflammatory drugs, and neurotrophic medicine, relieved the patient's symptoms.

## Case Presentation

A 50-year-old woman presented with a twenty-year history of low back pain radiating to left leg creating a tingling sensation. Twenty-six years prior she had been diagnosed with Lumbar Disc Herniation (LDH) and had received conventional discectomy. Nothing else remarkable was found in the patient's past history. In the following years, she had seldom suffered from terrible back or leg pain. At the time of the presentation to our institution, she had been bothered for twenty days with numbness of the left leg and the claudication distance progressively shortened from 1000 m to 500 m.

On clinical examination old surgical scars about 7 cm long were observed in the middle of her waist, with tenderness (+) and tapping pain (+) between the spinous processes of the L4/5. The result of the Straight Leg Raising (SLR) test was 50° for the left leg. Deficits in sensation and muscle strength were ascertained at L4/5. The Visual Analogue Scale (VAS) for the Waist was 5 scores, and for the left lower limb were 6 scores.

Lumbar X-ray examination showed mottled bone density around the spinal canal posterior to the spinal cord ranging from T10 to S2 (Figure 1A, 1B). Reconstructive Computed Tomographic images (CT) revealed hyperdense plaques ossificans on the posterior surface of the spinal canal (Figure 1C, 1D). Magnetic Resonance Imaging (MRI) demonstrated L4/5 horizontal spinal canal stenosis (Figure 1E, 1F). The suspected diagnosis was DO. Due to minor spinal cord compression, conservative treatment was selected.

## Discussion

Dural, arachnoid and leptomenigeal membranes wrap around the spinal cord. Small regions of calcification in these spinal meninges are common with aging but are usually asymptomatic. Calcified arachnoid and/or dural plaques can be found in autopsy findings with an incidence of 43% to 76% [1]. The concept of Arachnoiditis Ossificans (AO) was first proposed in 1971 by Kaufman and Dunsmore [2]. Subsequently, there have been many clinical reports on ossificans, most of which



**Figure 1:** A, B) Radiographs of the spine showed a hyperdense plaques ossificans dorsally in the vertebral canal to vertebral bodies T10-S2. C, D) CT scans demonstrated a roundish structure along the entire length of the lumbosacral canal. The ossified and occasionally chondroid plaques were located dorsally to the spinal cord. E, F) In the sagittal and transverse T2-Weighted (T2W) images, a left disc herniation secondary to spinal canal stenosis can be observed.

are associated with motor neuron disease. There are relatively few clinical reports on large dural calcifications or ossificans.

Radiographs sometimes can overlook small, ossified plaques so that X-rays are generally difficult to use for diagnosis. In this case, X-rays showed a beaded increased density shadow along the posterior portion of the spinal canal of the patient, which is relatively rarely reported. CT more clearly shows the situation in the spinal canal because of its sensitivity and specificity to detect ossification plaques. The typical calcification/ossification plaque on CT shows high density, which is easy to distinguish from lower density membrane sac and nerve tissue. MRI mostly showed cystic changes with low specificity, but the final diagnosis should be confirmed by autopsy or pathological specimens harvested intra-operatively. This patient did not receive surgical treatment and lacked pathological specimens to support the diagnosis, leading to a relative lack of evidence to confirm the diagnosis. To the best of our knowledge, hyperdense plaques ossificans of the dura has not been reported in this case. Additionally, in our case DO was associated with LSS.

The etiology of ossified dural plaques remains unknown. It may be a result of an end-stage adhesive chronic inflammatory process as a complication of prior trauma, surgery, infection, or meningitis hematoma [3,4]. Dural ossification may be the metaplasia of the connective tissue of the dural epithelium. It is believed that mature bone arises from these connective tissue cells derived probably from undifferentiated mesenchymal cells with osteogenic potential. This osseous metaplasia can occur secondary to any process that incites chronic inflammation [5]. Domestic reports on the causes of calcification of the arachnoid and dura mater mostly cite trauma and infection, with a chronic inflammatory response associated with the spinal canal, but thus far no studies have shown that ossification results from inflammation. Antila et al. [6] reported a cat with spinal dural ossification after an accident in which the cat fell from a stand approximately 1.5 meters high. However, the cat showed only a mild chronic inflammatory reaction. The patient in the current case had a history of lumbar discectomy decompression. It is possible that Dura Ossificans (DO) is a rare condition associated with previous spine surgery.

Dura mater ossificans with lumbar spinal stenosis often is associated with progressive neurological deficits that can require surgical treatment. There is a classification of spinal AO [1,7], which

can be applied to DO surgical or conservative treatment. Types I and II usually are located in the thoracic spine, which is composed of semicircular or circular caudal fibers. For type III, the environment of the spinal nerves is more stable and DO is seldom progressive because of the surrounding caudal fibers. Jaspan et al. [8] summed up their localization into three types (extradural, arachnoidal and intradural). We evaluated the surgical indications and outcome of treatment in relation to varying aspects of the calcification. This patient was classified as AO type II, and the necessity for surgical treatment was controversial, so no surgical treatment was performed. We relieved the suffering of the patient with conservative treatment. The waist scores for VAS ranged from 5 to 2, and VAS scores for the left leg from 6 to 3.

## Conclusion

There are few reports about DO and/or AO. The etiology, disease progression, clinical classification, surgical strategy, prognosis and complications of dural calcification still need more clarification.

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