ABSTRACT
The aim is to present a rare case of ligamentum flavum hematoma in the lumbar region, discuss its physiopathology and treatment and review the literature. A woman aged 68 presented with neurogenic claudication due to degenerative lumbar spondylolisthesis that evolved into a sudden worsening with cauda equina syndrome. The magnetic resonance imaging (MRI) showed signs of degeneration of the lumbar spine, with a narrow spinal canal from L2 to S1, anterolisthesis L4 L5 and an expansive lesion hyperintense on T1-weighted and hypointense on T2-weighted images considered compatible with hematoma in the topography of the yellow ligament in L1-L2. The patient underwent laminectomy and lumbar fixation. Her evolution was good in the postoperative period and at 18 months of follow-up she walked alone, despite the pain that is controlled with simple medications. Even though rare, it seems that ligamentum flavum hematoma has a relationship with the degeneration and rupture of small vessels associated with micro trauma to the spine. Its physiopathology is not well defined and treatment is similar to other spine compression processes.

Keywords: Spine; Cauda Equina; Ligamentum flavum; Hematoma; Laminectomy; Spondylolisthesis.

CASE REPORT
A 68-year-old woman had a history of lumbar pain irradiated with an unbearable pain and a decrease in quality of life, despite pharmacological treatment. During hospitalization for treatment and investigation, she presented with high and sudden lumbar pain and investigation, she presented with high and sudden lumbar pain and a rapid neurological deterioration because of a cauda equina syndrome which was due to an advanced degenerative disease; the patient underwent a laminectomy and fixation of lumbar instability. The pertinent literature is discussed and reviewed.

INTRODUCTION
Ligamentum flavum hematoma (LFH) is a rare cause of radicular or spine compression. It usually occurs in mobile segments of the spine, and it seems to bear a relation with smaller traumas; however, this relation does not occur in some cases as indicated by some reports, as this one. From the pathologic standpoint, there is a degeneration of the ligament with the subsequent rupture of small-winding vessels. The present report it is a case of a patient presenting with a rapid neurological deterioration because of a cauda equina syndrome which was due to an advanced degenerative disease; the patient underwent a laminectomy and fixation of lumbar instability. The pertinent literature is discussed and reviewed.

CASE REPORT
A 68-year-old woman had a history of lumbar pain irradiated to the posterior surface of the thighs at rest; the pain was associated to progressive limping. More recently, the patient presented with an unbearable pain and a decrease in quality of life, despite pharmacological treatment. During hospitalization for treatment and investigation, she presented with high and sudden lumbar pain and a rapid neurological deterioration because of a cauda equina syndrome which was due to an advanced degenerative disease; the patient underwent a laminectomy and fixation of lumbar instability. The pertinent literature is discussed and reviewed.
loss of strength in lower limbs. The neurological exam showed crural paraparesis degree I and urinary incontinence, characterizing cauda equina syndrome. The patient underwent magnetic resonance imaging (MRI), which showed degenerative signs of the lumbar spine with a narrowed spine canal of L2 and S1, anterolisthesis of L4 upon L5 and, at the level of L1–L2, a posterior lesion hyperintense in T1–weighted and with hypointense in T2–weighted (Figure 1 and 2).

The patient underwent decompression of the cauda equina by laminectomy of L1 to L5 and posterolateral fixation with pedicular screws from L1 to S1 plus intertransversal graft from iliac. During surgery, it was observed that the interior of the lesion between L1-L2 had hemorrhagic content in different stages of absorption, which characterized several episodes of bleeding at different times (Figure 3).

Presently, the patient is at 18 months of follow up and, after several physiotherapy sessions, is gradually recovering strength. Today, she walks unassisted and makes eventual use of analgesic medication for lumbalgia.

**DISCUSSION**

Currently, a few cases of ligamentum flavum hematoma have been reported in the English literature indexed: one case in the cervical spine, 3 cases in the thoracic spine, and the remaining, as well as the present case, in the lumbar spine (Table 1). The most distinguishing characteristic is that most patients are male. Most cases presents a small trauma as the probable genesis of the hematoma; however, one of the 3 cases of Spuck et al. did not present a history of trauma or intensive physical exercises; it was related to the complication of a percutaneous procedure for relief of low lumbar pain. The case presented herein was related only to a severe lumbar disease, although the hematoma was located at a superior level when compared to the alterations.

The ligamentum flavum consists of elastic fibers and collagen. It is poorly vascularized, and few small vessels go through it. The ligamentum flavum is an unlikely site of bleeding because of its poor vascularization and the constant tension forces to which the ligaments of the vertebral spine are submitted. An exception to this is to the presence of a severe degenerative process. Minamide et al. suggests that bleeding is related to irregular vessels of thin walls in a ligament that is degenerated and hypertrophied. An increase in abdominal pressure after a small trauma would transmit the pressure to these thin-walled vessels, then the proliferated vessels may be susceptible to rupture, causing the hematoma. Miyakoshi et al. suggests that the poor alignment of the vertebral spine submits the ligamentum flavum to an excessive axial load at a given point and relates this fact to the genesis of the hematoma that occurred according to his report at the level of T9-T10. A small trauma and poor vascularization may be important predisposing factors that increase the risk of hematoma; however, in the present case there was no injury of any kind, and the hematoma occurred far from where the greatest degenerative compromise was, which contradicts the present theory. Moreover, according to Yamaguchi et al., if the genesis of the hematoma depends on the presence of lumbar degeneration and small injuries, why is it so rare?

At the lumbar levels, tolerance to compression seems to be higher than at other levels. As result, the gradual formation of the hematoma or granuloma may take weeks to become symptomatic. The differential diagnosis includes synovial cyst, ganglion cyst, spontaneous epidural hematoma, neoplasia, and other cystic lesions.

Magnetic resonance imaging is the method of choice for diagnosis. In T2–weighted the hematoma appears as a hyperintense cyst that is very similar to a juxtafacet cyst. Images depend on the size, location and mainly age of the hematoma. In the acute stage, it appears hypointense in T2–weighted and isointense in T1–weighted.

![Figure 1. MRI T1–weighted: Degeneration of multiple lumbar levels with anterolisthesis of the body of L4 and retrolisthesis of the bodies of L2 and L1. Hyperintense image between as spinal apophysis of L1 and L2 causing compression and narrowing of the spine canal.](image1)

![Figure 2. MRI T2–weighted: Aspect of the L1-L2 lesion with a peripheral hypointense image and hyperintense in its interior.](image2)

![Figure 3. Transoperatory image: Broad laminectomy from L1 to L5. The arrow points to the open hematoma of the ligamentum flavum and its content being aspirated. Note the various phases of absorption of the hematoma.](image3)
Between the third and seventh day, the meta-hemoglobin makes the image hyperintense in T1–weighted. In the next weeks, the hemolysis of eritrocytes results in the accumulation of extracellular meta-hemoglobin that appears hyperintense in T1–weighted and meta-hemoglobin T–2 weighted. In the next weeks, the hematoma’s image hyperintense in T1–weighted. In the case presented herein, we opted for laminectomy for the removal of the hematoma and fixation with pedicular screws for treatment of spine instability in the inferior levels, especially at L4–L5 with the extension of the fixation up to L2–L3 where the laminectomy was performed.

Albanese et al.14 reviewed the literature and found excellent follow up on all cases of epidural hemorrhage due to ligamentum flavum hematoma. The authors points out that early decompression is essential for improvement of symptoms, however reviews all cases of epidural hemorrhage, regardless of cause. Tamura et al.15 suggest that if a patient presents with a lesion and symptoms such as those described here, the lesion should be surgically removed as soon as possible.

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Table 1. Reported Cases of Ligamentum Flavum Hematoma.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Ag / sex</th>
<th>Level</th>
<th>Symptom</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
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<tbody>
<tr>
<td>Sweasey et al.16</td>
<td>43 f</td>
<td>L4-5</td>
<td>Back &amp; leg pain</td>
<td>R</td>
<td>Excellent</td>
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<tr>
<td>Cruz-Conde et al.6</td>
<td>L4-5</td>
<td>Leg pain</td>
<td>R</td>
<td>Excellent</td>
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<tr>
<td>Minamide et al.11</td>
<td>L4-5</td>
<td>Leg pain</td>
<td>L</td>
<td>Excellent</td>
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<tr>
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<td>R</td>
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<td>R</td>
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<td>Hirakawa et al.8</td>
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<td>Low back pain</td>
<td>F + Fu</td>
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<tr>
<td>Maezawa et al.5</td>
<td>T11-12</td>
<td>Epiconus Syndrome</td>
<td>L</td>
<td>Numbness</td>
<td></td>
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<tr>
<td>Chi et al.18</td>
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<td>Radiculopathy</td>
<td>L</td>
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<td></td>
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<tr>
<td>Mizuno et al.13</td>
<td>L4-5</td>
<td>Leg pain &amp; Weakness</td>
<td>L</td>
<td>Excellent</td>
<td></td>
</tr>
<tr>
<td>Miyakoshi et al.3</td>
<td>T9-10</td>
<td>Leg Weakness &amp; numbness</td>
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<td>Excellent</td>
<td></td>
</tr>
<tr>
<td>Chen et al.5</td>
<td>C3-4</td>
<td>Neck/Arm pain &amp; Weakness</td>
<td>L</td>
<td>Excellent</td>
<td></td>
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<tr>
<td>Yamaguchi et al.6</td>
<td>L3-4</td>
<td>LBP &amp; Weakness</td>
<td>HL</td>
<td>Excellent</td>
<td></td>
</tr>
<tr>
<td>Spuck et al.19</td>
<td>L2-3</td>
<td>Claudication</td>
<td>IL</td>
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<tr>
<td>Mihaylov et al.7</td>
<td>L4-5</td>
<td>Leg pain &amp; Weakness</td>
<td>IL</td>
<td>Excellent</td>
<td></td>
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<tr>
<td>Chen et al.5</td>
<td>L4-5</td>
<td>Leg pain &amp; Weakness</td>
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<td>Albanese et al.14</td>
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<td>R</td>
<td>Numbness</td>
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<td>L4-5</td>
<td>LBP &amp; Hypoesthesia L5-S1</td>
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<td>Excellent</td>
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<td>Tamaru et al.15</td>
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<td>L</td>
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<td>Kim et al.18</td>
<td>L2-3</td>
<td>Cauda equina syndrome</td>
<td>L</td>
<td>Numbness</td>
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</tr>
<tr>
<td>This paper</td>
<td>L1-2</td>
<td>Cauda equina syndrome</td>
<td>L + Fu*</td>
<td>Frankel D</td>
<td></td>
</tr>
</tbody>
</table>

(R) Resection; (F) facetectomy; (L) Laminectomy; (HL) Hemilaminectomy; (IL) Interlaminectomy; (Fu) Fusion; (LBP) Low back pain. * Fusion with pedicular screws for treatment of vertebral instability in the inferior levels.