## A Case with Rapid Progression of Anemia Due to an Intravertebral Body Pseudoaneurysm with a 3-Column Osteoporotic Vertebral Fracture from Ankylosing Spinal Disorder

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## **Keywords:**

intravertebral body pseudoaneurysm, 3-column fracture, ankylosing spinal disorder, diffuse idiopathic skeletal hyperostosis, endovascular embolization

> Spine Surg Relat Res 2021; 5(4): 313-316 dx.doi.org/10.22603/ssrr.2020-0099

An ankylosing spine can cause unexpected damage to the surrounding tissues because of enhanced instability from the altered biomechanical or pathological features from the ankylosed spinal deformity. Physicians should take care of the possible pathology in dealing with these patients.

An 84-year-old female injured her lower back with a diagnosis of the third lumbar vertebral (L3) fracture by falling on the floor at home (Fig. 1(A, B)). She showed no specific neurological disorder, including bladder and rectal disturbance, but mild anemia (Table 1). Computed tomography (CT) scan revealed a 3-column fracture of an ankylosing spine at the L3 level (Fig. 1(C, D)). Her medical history included hypertension with medication, and osteoporosis treated with risedronate and eldecalcitol. Her previous surgical history was for a left femoral neck fracture at 76 years old. She had no history of rheumatoid arthritis or prior steroid therapy.

Two days post-injury, the patient showed rapidly progressing anemia and a decreased systolic blood pressure around 70 mmHg with tachycardia (>100 beats/minute). She received a transfusion followed by vasopressor agents and was evaluated for any active hemorrhagic lesion. Her fecal occult blood test and upper gastrointestinal tract endoscopy were negative. A whole-body contrast-enhanced CT showed an aneurysm originating from the aorta, located in the fractured L3 vertebral body gap, with no apparent contrast leakage. (Fig. 2(A)). Four days post-injury, the anemia had progressed further, and the patient also developed thrombocytopenia. She remained lucid with a preserved systolic blood pressure around 120 mmHg with a heart rate of 110 under low-dose vasopressor treatment. The patient received another transfusion, including fresh frozen plasma. Additional dynamic CT angiography revealed an active hemorrhagic lesion, composed of a pseudoaneurysm, originating from the L3 segmental artery and an arteriovenous fistula with the perivertebral veins (Fig. 2(B)). Her pathological condition was at risk for further massive hemorrhage, indicating the need for transcutaneous endovascular embolization of the intravertebral pseudoaneurysm with an abdominal aorta stenting (Fig. 2(C)). The next day after the intervention, the patient's blood pressure and heart rate were stable, and she was successfully weaned from vasopressor treatment. Six

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Received: May 20, 2020, Accepted: August 11, 2020, Advance Publication: September 23, 2020

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**Figure 1.** The patient had an existing ankylosing change in her lumbar spine (A) and vertebral cleft in the L3 vertebral body (B, C) with posterior lamina fracture (C, D: yellow arrow).

Time axis	injury, admission	2nd day	3rd day	4th day, changing hospital, operation	post operative day 2	day 3	1week	2week	3month
RBC (×10 <sup>6</sup> /ml)	3.17	2.12	2.37	2.02	3.3	3.54	3.65	4.03	3.63
Hb (g/dl)	9.8	7	7.4	6.3	10.2	10.9	11.3	12.4	11.8
Hct (%)	29.5	20.6	217	18.4	29	32	32.9	36.3	34
PLT (×10 <sup>3</sup> /ml)	165	112	84	81	58	91	216	257	216
Transfusion		RCC 2 units			RCC 6 units FFP 6 units				

Table 1. The Patient's Laboratory Data.

RBC, red blood cell; Hb, hemoglobin; Hct, hematocrit; PLT, platelet; RCC, red cell concentrates; FFP, fresh frozen plasma.

days after the intervention, she got to be able to raise her upper body freely on the bed with stable vital signs. At eight days, she could sit in a wheelchair and was able to stand up and to walk 18 days post-intervention. She finally discharged with a T-cane two months after the injury. Her radiological examination showed stable bone fusion of the L3 vertebral body one year after the injury (Fig. 2(D)). The patient had a potential indication for spinal fusion surgery with instrumentation<sup>1-3</sup>. However, we decided on conservative treatment because of her altered general condition and her family's request to avoid further invasive treatment. We asked her to wear a hard brace and prescribed careful rehabilitation, followed by constant radiological follow-up. She wore her brace for about six months post-discharge until she acquired radiological stability.

Osteoporotic vertebral fractures can occur from trivial events; sometimes, occult fractures cannot be detected by primary radiological assessments<sup>4)</sup>. They can cause chronic back pain by pseudoarthrosis, spinal kyphosis, and scoliosis. These may also trigger other disturbances, including gastroe-sophageal reflux disease, which can significantly deteriorate the patients' daily living activities. Intravertebral aneurysm is very rare, with just a single case report<sup>5)</sup>, defined as a nontraumatic rupture of the lumbar artery with a pseu-

doaneurysm in the vertebral body with a massive retroperitoneal hematoma treated by endovascular embolization. The current case indicates that the 3-column L3 vertebral body fracture caused the intervertebral cleft with spinal instability. This condition pinched the surrounding segmental vessels and caused the intravertebral pseudoaneurysm to bleed (Fig. 3). Considering another ankylosing spine pathology, we speculated that the capillary vessel injury at the intravertebral pseudoaneurysm caused progressing anemia.

In conclusion, the current case showed a rare pathology of progressive anemia due to the injured intravertebral pseudoaneurysm after a 3-column fracture in an osteoporotic patient with an ankylosing spine. Our radiological evaluation included contrast CT scan and angiography to detect and treat the bleeding pathology using an intravascular stent. If we find rapid progress of anemia in vertebral fracture patients with osteoporosis and ankylosed spinal disorder, immediate pathophysiological understanding and appropriate treatment is required, considering the possible vessel injury shown in the present case.

**Disclaimer:** Prof. Sumihisa Orita is one of the Editors of Spine Surgery and Related Research and on the journal's Editorial Committee. He was not involved in the editorial



**Figure 2.** (A) Contrast-enhanced CT showed the aneurysm originated from the aorta located within the pre-existing L3 vertebral body, with no apparent contrast leakage. (B) The pseudoaneurysm's shape matched the fractured L3 vertebral body. The left L3 segmental artery supplied the blood that formed the arteriovenous fistula with perivertebral veins. (C) An intravascular stent in the abdominal aorta. (D) The patient's evaluation showed stable bone fusion of the L3 vertebral body one year after the injury (Arrow).



Figure 3. The pathological condition for the current case.(A-C) After the generation of the cleft due to the 3-column vertebral fracture, followed by an unstable spine, the segmental artery beside the growing cleft was impinged. The aneurysm progressed within two days post-injury.(D) Spinal instability due to the 3-column fracture caused the intravertebral pseudoaneurysm to bleed.

evaluation or decision to accept this article for publication at all.

**Conflicts of Interest:** The authors declare that there are no relevant conflicts of interest.

Author Contributions: All of the authors contributed as the primary physicians. TS and SuO wrote the manuscript TS, SuO and MH are equally contributed. All the authors reviewed the manuscript.

Ethical Approval: Not required.

Sources of Funding: none

Informed Consent: Informed consent was obtained by

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