Warfarin-Induced Vertebra Fracture: A Case Report

Warfarin Nedenli Vertebra Kırığı: Olgu Sunumu

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Abstract
Warfarin, a coumarin derivative anticoagulant, is a vitamin K antagonist. Vitamin K plays an important role in bone metabolism. Long-term warfarin use has been reported to increase the fracture risk of rib and vertebra. Here, we present a case of a 60-year-old man, who encountered a compression fracture of Th6 vertebra due to chronic warfarin use. Several drugs, which affect bones at long-term use, are discussed in this study. Patients both with many systemic comorbidities-cardiovascular diseases in particular and in the habit of using anticoagulant drugs should carefully be assessed for the fracture risk of vertebra.
Keywords: Anticoagulant Treatment, Back Pain, Compression Fracture, Vertebra, Warfarin

Öz
Warfarin, kumarin türevi bir antikoagülan olup K vitamini antagonistidir. K vitamini kemik metabolizmasında önemli bir rol oynar. Uzun süreli warfarin kullanımının, kot ve vertebra kırığı riskini arttırdığı bildirilmiştir. Burada, kronik warfarin kullanımına bağlı Th6 vertebra kompresyon kırığı ile karşılaşılan 60 yaşındaki bir erkek olguyu sunuyoruz. Çeşitli ilaçların uzun süreli kullanımlarında kemik üzerine etkileri tartışıldı. Birçok sistemik ek hastalığı özellikle kardiyovasküler hastalığı olan ve antikoagülan ilaçlar kullanan hastalar vertebra kırık riski açısından dikkatlice değerlendirilmelidirler.
Anahtar Kelimeler: Antikoagülan Tedavi, Sırt Ağrısı, Kompresyon Kırığı, Vertebra, Warfarin

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Introduction

Warfarin, a coumarin derivative anticoagulant, is a vitamin K antagonist that produces its anticoagulant effect by interfering with the recycling of vitamin K, thus blocking gamma-carboxyglutamate (Gla) formation (1). Vitamin K also plays an important role in bone metabolism (1).

Currently, although warfarin is administered to millions of people worldwide to prevent thromboembolic diseases, the mechanisms by which this drug affects the skeleton have been poorly understood (2). Osteocalcin, a Gla-containing protein, is synthesized and posttranslationally modified in osteoblasts before it is secreted into serum (1). Carboxylated osteocalcin plays a role in bone formation by facilitating calcium binding to the hydroxyapatite matrix of bone, and Gla residues are necessary for this binding to occur (1). Because warfarin can inhibit the actions of vitamin K in anticoagulation factors, the carboxylation of osteocalcin may also be inhibited, but the clinical implications of uncarboxylated osteocalcin are not well understood (1). We report a case of warfarin-induced bone changes and several other drugs, which are known to have effects on bone and bone metabolism.

Case

A 60-year-old man admitted with 2-year history of intermittent back pain that had markedly increased in the last 2 months. A thorax computed tomography (CT) taken at another hospital revealed a compression fracture of Th6 vertebra. Magnetic resonance images (MRI) were compatible with that of thorax CT (Figure 1). Only analgesic treatment was given by an orthopedist at the initial hospital but that did not relieve his pain.

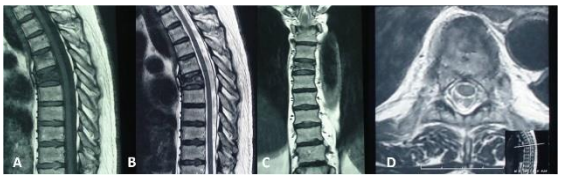

Figure 1. The axial, sagittal and coronal views of MRI showed compression fracture of Th6 vertebra.

Patient had a history of coroner bypass surgery and congestive heart failure. His medication included warfarin sodium (10 mg/daily), digoxin (0.25 mg/daily, five days in a week), furosemide (40 mg/daily), spironolactone (100 mg/daily), carvedilol (12.5 mg/daily), and ramipril+hidroklorotiyazid (5 mg/daily) for the past 10 years after valve replacement. He did not have any trauma. No significant neurological abnormality was noted on examination. Serum creatinine and serum phosphorus levels were within normal limits. Bone scintigraphy and abdominal and thorax CT studies were performed. No sign of infection or neoplasms such as multiple myeloma or brucellosis without chronic fractures at the Th6 vertebra could be detected. The patient's control thoracic vertebra CT did not reveal any increase in compression fracture. A brace, bed-rest, and analgesic treatments were given for over 3 months. Additionally, calcium, vitamin D and vitamin K were supplemented. The dose of warfarin sodium was reduced (5 mg/daily). Control CT images in the end of the 3rd and 6th months demonstrated the same findings as in the first CT. Sclerosing was observed but there was no angulation (Figure 2). During conservative treatment the patient reported significant relief of his

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symptoms, and 8 months after the onset of symptoms, only minimal back pain had remained.

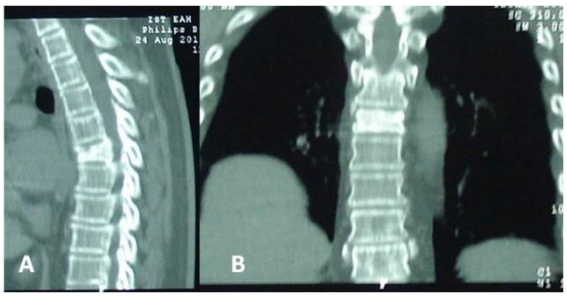

Figure 2. A control CT images revealed sclerosing. There was no angulation.

Discussion

Long-term warfarin use has been reported to increase the fracture risk of rib and vertebra (2). Warfarin use was not associated with bone mass, bone loss or fracture risk in elderly men, while its long-term use has been reported to increase the rate of vertebra and rib fractures in elderly patients (3, 4, 5). Neil Binkley et al. reported that vitamin K deficiency due to long-term warfarin anticoagulation therapy does not alter skeletal status in male rhesus monkeys with a high dietary calcium and vitamin D intake (6).

Sugiyama et al. investigated the effects of long-term warfarin use on fracture risk in the rats (2). They hypothesized that warfarin would impair bone material quality but could not weaken bone strength under conditions with higher mechanical stimuli. Consistent with these lines of evidence, warfarin, a vitamin K antagonist, has been suggested to increase fracture risk by impairing bone quality. They found that warfarin did not change bone mineral density (BMD), but markedly decreased osteocalcin content, diminished mineral size, and impaired material hardness (2). Osteocalcin-induced delay of mineral crystal nucleation decreased mineral formation rate, increased mean and distribution of mineral sizes, and strengthened mineral rigidity (2). It had been hypothesized that current warfarin users would have lower bone mass, faster bone loss, and greater fracture risk (2). An interesting research showed that long-term exposure to coumarin derivatives might cause osteopenia in children with the risk of developing osteoporosis later in life (7). Pearson DA reviewed the epidemiological studies and clinical trials (8). The results indicated that vitamin K has a positive effect on bone mineral density (BMD) and decreased fracture risk and typical dietary intakes of vitamin K is associated with better BMD and reduced fracture risk (8). The research suggested that at least clinicians should carefully assess anticoagulated patients for osteoporosis risk, monitor BMD, and refer them to dietitians for dietary and supplement advice on bone health (8). A recent interesting review focused on heart drugs that affect bone (9). They assessed that drugs given to treat cardiovascular diseases may impact on bone health in either a beneficial or a harmful way (9). They found that nitrates, statins, thiazide diuretics, and β-blockers are beneficial to bone, but some drugs such as loop –acting diuretics and warfarin are harmful to bone (9).

Corticosteroid use, hypogonadism, alcoholism and transplantation are some of the factors, which definitely affect bone quality on long-term administration. So, physicians should be aware of this entity and carefully assess the patient who had systemic comorbidities especially cardiovascular diseases and particularly anticoagulant drugs for fracture risk of vertebra. According to our observation, chronic warfarin administration may increase fracture risk of vertebra. We recommend the conservative treatment and warfarin taper, whereas surgery is required within the patients of neurological deficits or progressive symptoms.

Informed Consent: Written informed consent was obtained from patient who participated in this case (20.02.2012).

References

1. Woo C, Chang LL, Ewing SK, Bauer DC. Single-point assessment of warfarin use and risk of osteoporosis in elderly men. J Am Geriatr Soc. 2008;56:1171-6.
2. Sugiyama T, Takaki T, Sakanaka K, Sadamaru H, Mori K, Kato Y, Taguchi T, Saito T. Warfarin-induced impairment of cortical bone material quality and compensatory adaptation of cortical bone structure to mechanical stimuli. J Endocrinol. 2007;194:213-22.
3. Caraballo PJ, Heit JA, Atkinson EJ, Silverstein MD, O'Fallon WM, Castro MR, Melton LJ. Long-term use of oral anticoagulants and the risk of fracture. Arch Intern Med. 1999;159:1750-6.
4. Pilon D, Castilloux AM, Dorais M, LeLorier J. Oral anticoagulants and the risk of osteoporotic fractures among elderly. Pharmacoepidemiol Drug Saf. 2004;13:289-94.
5. Gage BF, Birman-Deych E, Radford MJ, Nilasena DS, Binder EF. Risk of osteoporotic fracture in elderly patients taking warfarin: results from the National Registry of Atrial Fibrillation 2. Arch Intern Med. 2006;166:241-6.
6. Binkley N, Krueger D, Engelke J, Suttie J. Vitamin K deficiency from long-term warfarin anticoagulation does not alter skeletal status in male rhesus monkeys. J Bone Miner Res. 2007;22:695-700.
7. Avgeri M, Papadopoulou A, Platokouki H, Douros K, Rammos S, Nicolaidou P, Aronis S. Assessment of bone mineral density and markers of bone turnover in children under long-term oral anticoagulant therapy. J Pediatr Hematol Oncol. 2008;30:592-7.
8. Pearson DA. Bone Health and Osteoporosis: The role of vitamin K and potential antagonism by anticoagulants. Nutr Clin Pract. 2007;22:517-44.
9. Walsh JS, Newman C, Eastell R. Heart drugs that affect bone. Trends Endocrinol Metab. 2012;23:163-8.