 Acta Chir Orthop Traumatol Cech. 89, 2022, No. 4
p. 312–314

A Scapular Spine Fracture Defined on the Basis of a Bisphosphonate: a Case Report and Review of the Literature

Zlomenina hřebene lopatky na podkladě užívání bisfosfonátů: kazuistika a přehled literatury

G. ILYAS[1], G. SENYUVA[2]

[1] Usak University Faculty of Medicine, Orthopaedics and Traumatology, Usak, Turkey
[2] Usak Training and Research Hospital, Orthopaedics and Traumatology, Usak, Turkey

SUMMARY

Bisphosphonates are commonly used in the treatment of osteoporosis. Long-term use without drug holiday causes the risk of atypical fractures. Subtrochanteric and femoral stress fractures are among the frequently described complications. In our case report; a stress fracture of the scapular spine, a previously undescribed adverse effect of bisphosphonates, is presented.

Key words: bisphosphonates, scapular spine, stress fracture, drug holiday.

BACKGROUND

Bisphosphonates are drugs that reduce bone mass loss by inhibiting the bone resorption effect of osteoclasts. Alendronate, risedronate, pamidronate, and zoledronate from the nitrogen-containing group are frequently used in the prevention and treatment of osteoporosis. Osteonecrosis of the jaw and atypical subtrochanteric and femoral stress fractures are common complications of long-term use of bisphosphonates (3, 9, 10, 11, 12). This is not the first case report of a bisphosphonate fracture of the scapula (13); yet, it is the first reported case of a scapular spine fracture defined on a bisphosphonate basis. In addition, non-bisphosphonate induced stress fractures of the scapula have been described previously as frequent (5, 6, 7, 14, 15).

CASE PRESENTATION

A 75-year-old female patient was admitted to our clinic with complaints of pain in both thighs and the left shoulder. In her history, it was learned that there was no trauma and she had been treated with alendronate Na for 11 years for osteoporosis. After the physical examination, radiographic imaging was performed. In lower extremity radiographs; more prominent on the left in the subtrochanteric femoral regions; bilateral lateral cortical thickening and transverse fracture patterns were detected (Fig. 1). In left shoulder imaging; midline cortical thickening and vertical fracture pattern were observed in the scapular spine (Fig. 2). Left shoulder computed tomography (CT) and magnetic resonance imaging (MRI) were performed in the case who was thought to

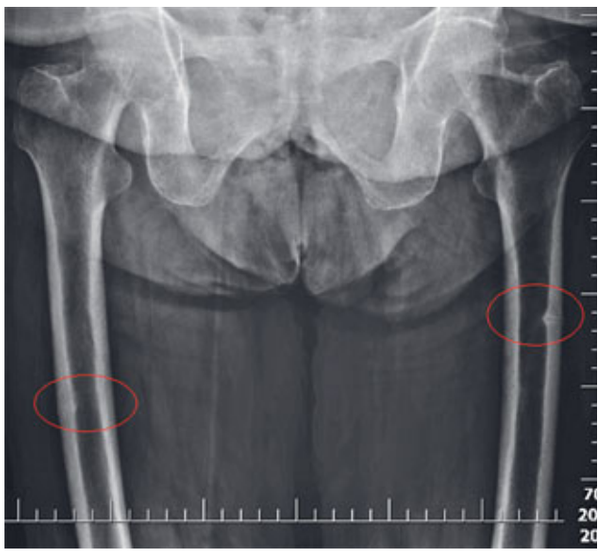

Fig. 1. Bilateral femoral stress fracture.

Fig. 2. Scapular spine stress fracture on X-ray.

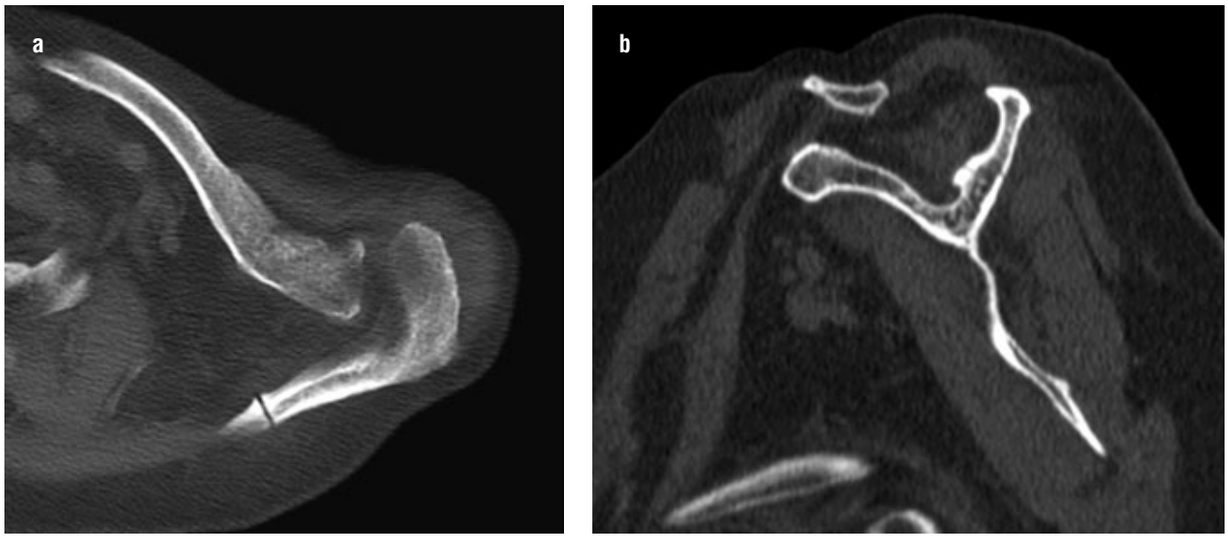

Fig. 3a, b. Scapular spine stress fracture on CT.

have a bisphosphonate stress fracture (Fig. 3a, 3b, 4). Bilateral antegrade femoral nailing was applied to the patient who had limited weight-bearing (Fig. 5). Since it is a non-weight-bearing bone; conservative treatment was performed on the scapular spine.

DISCUSSION

Bisphosphonates are widely used in the treatment of osteoporosis, but they can show serious adverse effects besides their therapeutic effect. The acromion stress fracture, presented by Haque in 2016, has been reported in the literature as the only scapula fracture defined based on bisphosphonates (13). In our case report; scapular spine stress fracture, a previously unrecognized complication of bisphosphonates, is presented.

Bisphosphonates are used in the treatment of vertebral compression fractures and non-vertebral fragility fractures in osteoporotic patients, in the treatment of malignancies, avascular necrosis and osteogenesis imperfecta; however, long-term uninterrupted use in the treatment of osteoporosis increases the risk of atypical subtrochanteric femoral stress fracture. In patients with low-to-moderate fracture risk, 2–3 years of drug holiday is recommended after 3–5 years of bisphosphonate therapy (2); however, a change in treatment is recommended in high-risk patients for fractures (2, 4). Femoral stress fracture may develop unilaterally or bilaterally. In our patient who was in the high-risk group for fracture (mean DEXA value: -3.7); oral alendronate Na was used continuously for eleven years and no drug holiday was made; as a result, scapular spine fracture was seen in addition to bilateral femoral stress fracture.

Another described serious side effect is osteonecrosis of the jaw, which is usually seen due to the use of high-dose bisphosphonate therapy (1). No osteonecrosis of the jaw was observed in our patient's oral examination.

Femoral stress fractures on bisphosphonate background; no or minimal trauma, no or minimal comminu-

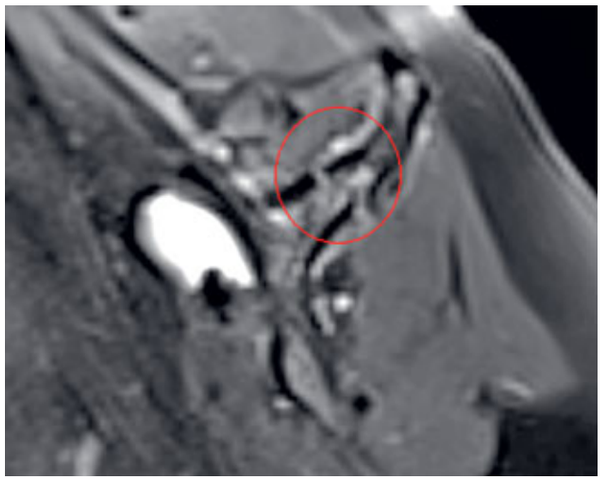

Fig. 4. Scapular spine stress fracture on MRI.

Fig. 5. Bilateral femoral antegrade nailing.

tion, often presents as a transverse fracture pattern and lateral cortical thickening. The fracture pattern we see in the scapular spine is vertical, but has all the other features. It is seen that the fracture line is perpendicular to the longitudinal axis of the bone, similar to the femoral transverse fracture pattern. Transverse fracture pattern, which usually develops in high-energy injuries, may develop as a result of low energy in stress fractures. In our case, vertical scapular spine fracture developed in addition to the bilateral transverse femoral stress fracture.

CONCLUSIONS

In patients receiving long-term bisphosphonate therapy, a drug holiday should be planned, and drug change should be considered if they are in the high-risk group for fractures. In these patients, shoulder pain should be carefully examined and investigated for stress fracture.

References

1. Abraham I. Intravenous bisphosphonate treatment and osteonecrosis of the jaw in patients with cancer: wide CIs, Yule-Simpson and King Kong effects, and no therapeutic outcomes. J Clin Oncol. 2010;28:e143–144, author reply e145–147. doi: 10.1200/JCO.2009.27.1270.
2. Adler RA, El-Hajj Fuleihan G, Bauer DC, Camacho PM, Clarke BL, Clines GA, Compston JE, Drake MT, Edwards BJ, Favus MJ, Greenspan SL, McKinney R Jr, Pignolo RJ, Sellmeyer DE. Managing osteoporosis in patients on long-term bisphosphonate treatment: report of a task force of the American Society for Bone and Mineral Research. J Bone Miner Res. 2016;31:16–35. doi: 10.1002/jbmr.2708.
3. AlDhalaan NA, BaQais A, Al-Omar A. Medication-related osteonecrosis of the jaw: a review. Cureus. 2020;12:e6944. doi: 10.7759/cureus.6944.
4. Cummings SR, Ferrari S, Eastell R, Gilchrist N, Jensen JB, McClung M, Roux C, Törring O, Valter I, Wang AT, Brown JP. Vertebral Fractures After Discontinuation of Denosumab: A Post Hoc Analysis of the Randomized Placebo-Controlled. J Bone Miner Res. 2018;33:190–198. doi: 10.1002/jbmr.3337.
5. Fink-Bennett DM, Benson MT. Unusual exercise-related stress fractures. Two case reports. Clin Nucl Med. 1984;9:430–434. doi: 10.1097/00003072-198408000-00002.
6. García-Coiradas J, López Y, Marco F. Stress fracture of the scapular spine associated with rotator cuff dysfunction: report of 3 cases and review of the literatüre. Rev Esp Cir Ortop Traumatol. 2014;58:314–318. doi: 10.1016/j.recot.2013.12.003.
7. Herickhoff PK, Keyurapan E, Fayad LM, Silberstein CE, McFarland EG. Scapular stress fracture in a professional baseball player: a case report and review of the literatüre. Am J Sports Med. 2007;35:1193–1196. doi: 10.1177/0363546506298278.
8. Kaleen N. Hayes, Elizabeth M. Winter, Suzanne M. Cadarette, Andrea M. Burden. Duration of bisphosphonate drug holidays in osteoporosis patients: a narrative review of the evidence and considerations for decision-making. J Clin Med. 2021;10:1140. Published online 2021 Mar 9. doi: 10.3390/jcm10051140.
9. Lo JC, Grimsrud CD, Ott SM, Chandra M, Hui RL, Ettinger B. Atypical femur fracture incidence in women increases with duration of bisphosphonate exposure. Osteoporos Int. 2019;30:2515–2520. doi: 10.1007/s00198-019-05112-5. Epub 2019 Sep 25.
10. Lo JC, Neugebauer RS, Ettinger B, Chandra M, Hui RL, Ott SM, Grimsrud CD, Izano MA. Risk of complete atypical femur fracture with Oral bisphosphonate exposure beyond three years. BMC Musculoskelet Disord. 2020;21:801. doi: 10.1186/s12891-020-03672-w.
11. Mücke T, Krestan CR, Mitchell DA, Kirschke JS, Wutzl A. Bisphosphonate and medication-related osteonecrosis of the jaw: a review. Semin Musculoskelet Radiol. 2016;20:305–314. doi: 10.1055/s-0036-1592367.
12. Silverman S, Kupperman E, Bukata S. Bisphosphonate-related atypical femoral fracture: Managing a rare but serious complication. Cleve Clin J Med. 2018;85:885–893, doi: 10.3949/ccjm.85a.17119.
13. Syed Haque and Radhakant Pandey. Case report of bisphosphonate-associated atypical scapular fracture and brief literature review. Int J Shoulder Surg. 2016;10:92–93. doi: 10.4103/0973-6042.180723.
14. Veluvolu P, Kohn HS, Guten GN, Donahue PM, Isitman AT, Whalen JP, Collier BD. Unusual stress fracture of the scapula in a jogger. Clin Nucl Med. 1988;13:531–532. doi: 10.1097/00003072-198807000-00015.
15. Zmistowski B, Gutman M, Horvath Y, Abboud JA, Williams GR Jr, Namdari S. Acromial stress fracture following reverse total shoulder arthroplasty: incidence and predictors. J Shoulder Elbow Surg. 2020;29:799–806. doi: 10.1016/j.jse.2019.08.004.

Corresponding author:
Gokhan Ilyas
Uşak Eğitim ve Araştırma Hastanesi
Uşak, Turkey
E-mail: gokhan.ilyas@usak.edu.tr