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First-Onset Seizure with Severe Osteoporosis, Adrenal Insufficiency and Multiple Fragility Fractures: A Case Report

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Abstract **Objectives:** Seizures occurring for the first time among adult individuals might result from an accompanying systemic, metabolic or neurological condition. Patient could suffer from a risk of bone fragility leading to a risk of injury resulting from muscle contractions from the onset of the seizure. **Case Report:** A 57-year-old patient suffering from hypertension, dyslipidemia and benign prostatic hyperplasia had a generalized first-time seizure without any preceding trauma. On physical examination, patient complained of back and pelvis pain, as well as inability to ambulate. Imaging examination confirmed the presence of bilateral acetabular fractures (comminuted), multilevel vertebral body compression fractures (thoracic and lumbar), left humeral head and right scapular fractures. Bone mineral density was estimated to have T-scores −2.9 (lumbar spine) and −3.4 (left femoral neck). Adrenal insufficiency and bilateral adrenal nodules were present. Seizure etiology remained unclear. Acetabular fractures underwent surgery, others were conservatively treated. Hospital course after the surgery was uneventful. At the time of the follow-up patient ambulated with the help of a cane. He still suffered from pain in hips and limited shoulder range of motion. **Conclusion:** Thorough screening for fractures in the patient who suffered from first-time seizure is crucial especially in presence of significant pain and/or limitation of motion without history of trauma. Presence of multiple fractures should be further assessed for possible presence of osteoporosis and its underlying causes.

Key Words First Seizure, Osteoporosis, Adrenal Insufficiency, Acetabular Fractures, Vertebral Compression Fractures, Case Report

INTRODUCTION

A seizure for the first time in an adult patient can be the presentation of an underlying systemic, metabolic, or structural disorder [1]. Apart from the neuropathology, there is increasing acceptance of metabolic conditions or endocrine abnormalities as possible etiological factors in the appearance of seizures among adults of middle age and elderly patients [1]. Electrolyte imbalance, insufficiency in hormonal regulation, or bone-mineral disturbances can coexist, interact, causing complications beyond the neurological system [1].

Osteoporosis is known as a "silent disease" until the stage of the fracture, but in severe cases it can be dramatic by causing multiple fractures without the presence of obvious trauma [2]. Seizures and bone injuries are established conditions that occur following convulsion seizures, while bilateral fractures of the acetabulum and vertebral compression fractures are unusual and most likely caused by high energy trauma [3]. The absence of trauma, in such conditions, should be considered as a possibility for bone fragility [3]. Metabolic causes for a seizure and predisposing factors to injury should be ruled out separately [4].

Adrenal insufficiency is an uncommon yet clinically important disease, with possible vague symptoms, which can remain unnoticed until the occurrence of any kind of stress or illness [5]. Coexistent metabolic imbalances and exposure to corticosteroids should be taken into consideration as well. The concomitance of adrenal insufficiency, severe osteoporosis and seizures creates a complex diagnostic-therapeutic problem that requires a multi-disciplinary approach including services of neurology, endocrinology and orthopedics.

We report a 57 year old male with a first seizure episode, with severe osteoporosis, adrenal insufficiency, bilateral fractures of the acetabula, multilevel vertebral compression fractures and upper-limb injuries.

This case highlights the importance of investigating unexplained severe pain and mobility problems for occult bone fractures in first time seizure patients.

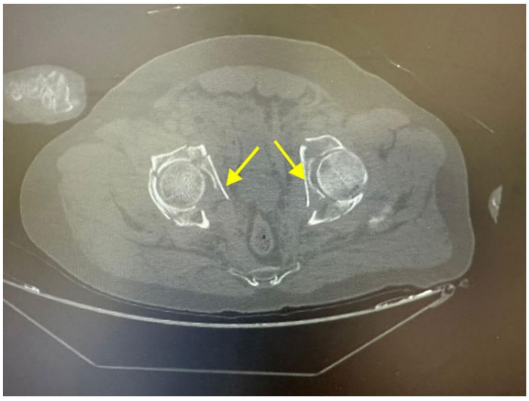


Figure 1: Bilateral Acetabular Fractures, Axial CT of the Pelvis Showing Comminuted Fractures of Both Acetabula (Arrows)

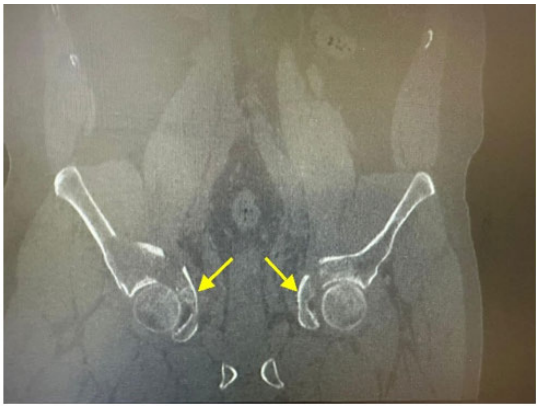


Figure 2: Bilateral Acetabular Fractures, Coronal View, Coronal Pelvic CT Showing Medial-Wall Displacement in the Bilateral Acetabular Fractures (Arrows)

Case Presentation

A 57 year old male patient with the medical history of arterial hypertension, hyperlipidemia, benign prostatic hypertrophy and previously unnoticed severe osteoporosis was admitted to the emergency department for a witnessed first seizure. According to his wife, the patient was asleep when he began experiencing muscle spasms of the bilateral upper limbs, accompanied by up-rolling of the eyes, in a seizure lasting several minutes, followed by confusion. No prior trauma, fever, vomiting, chest pain, or any form of epilepsy were reported. On admission, the patient was complaining of pain in the back area, interscapular region and incapacity to walk. First vital signs measured in ED were characterized by borderline hypotension (98/60 mmHg), while oxygen saturation and body temperature were within normal limits. Neurological examination revealed full consciousness (Glasgow Coma Scale-15/15), fluent speech, normal functioning of cranial nerves and preserved motor skills on the parts of the patient that could be assessed. Pain limited lower limb assessment.

Brain computed tomography revealed absence of acute intracranial pathology. Pelvic computed tomography scan revealed bilateral fractures of the acetabular bone involving the anterior and posterior column as well as extending into iliac bones, with no involvement of the joint space (Figures 1 and 2).

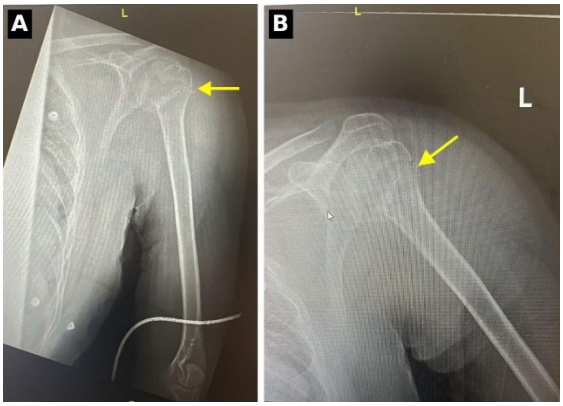


Figure 3: Left Shoulder Radiograph Showing the Left Humeral Head Fracture, Radiographs of the Left Shoulder in Two Views: (A) Full Humerus and (B) Close View of the Shoulder, Showing the Fracture of the Humeral Head (Arrows)



Figure 4: Lumbar Components of the Vertebral Compression Fractures, Sagittal CT of the Lumbar Spine Showing Compression Fractures with Loss of Vertebral Height and no Retropulsion into the Spinal Canal. Arrows Indicate the Compression Fractures at L2 and L4

Other fractures were a left humeral head fracture, a right scapular fracture and numerous compression fractures of the vertebral levels of T6, T7, T8, T11, T12, L2 and L4, with no retropulsion at L2 (Figures 3 and 4).

Abdominal and pelvic CT revealed small hemoperitoneum, bilateral obturator and left adductor muscle hematoma, bilateral hemarthrosis of the hips and severe steatosis of the liver, with no signs of solid organ injury. Bone fracture identification occurred following seizure with no history of major trauma.

Bone mineral density assessment demonstrated that the patient had lumbar spine and left femoral neck T scores of −2.9 and −3.4, respectively. Assessment of both proximal

femora demonstrated values in the osteoporotic range. The lab results revealed that the patient had hypocalcemia, increased parathyroid hormone level and slightly reduced vitamin D level. Adrenal insufficiency was reported. Treatment with prednisolone 5 mg daily was initiated. The date and etiology of this condition were unclear. Other examinations showed that the patient had bilateral adrenal nodules of 0.9 and 1.1 cm in size on the right and left sides correspondingly with precontrast densities of 29 HU and 26 HU correspondingly. Thus, the patient was referred for the third-level evaluation by an endocrine surgeon. The surgery for bilateral acetabular fractures occurred on 26 September 2024 and the left humeral head and right scapular fractures were treated in a conservative manner. There were no complications during recovery period and the patient was discharged on 3 October 2024. The therapy with teriparatide was started in October 2024 for the management of osteoporosis and fragility fractures. Neurology and neurosurgery evaluated the patient. No acute abnormality on brain CT and need in any acute intervention was determined. The case in question was managed in a conservative manner and the reason remained unclear.

Follow-up of the patient in July 2025, approximately nine months after surgery, revealed that the patient used cane for complete ambulation. The patient had bilateral hip pain which persisted constantly, early fatigability while walking long distances or going upstairs and restricted movement of the left shoulder. The examination found out hip muscle weakness and impaired range of motion of the left shoulder. A physical therapy regimen involving hip and thigh strengthening, stretching and strengthening of periscapular and rotator cuff muscles and progressive shoulder ROM was recommended.

DISCUSSION

Another complication which is associated with generalized convulsive seizure but occurs rarely is seizure-related fractures [1]. Seizures include very strong and synchronous muscle contractions. These contractions can produce the same stresses that are created by trauma with high energy, thus resulting in fractures in places which are not prone to breakage if they are not exposed to high-energy forces [6]. Fractures of pelvis and acetabulum after seizures may be hard to identify in the presence of no evident history of trauma [6].

Seizure-induced contraction of pelvic and thigh muscles can drive femoral head into acetabulum [7]. Although literature about nontraumatic bilateral acetabular fractures after seizures is limited, such cases demonstrate that the risks of fractures cannot be overlooked during post-ictal examination especially if the patients reported pain and immobility despite lack of traumatic history [8]. In addition to the force transmission through muscles, bone health is an important predictor of fracture development in association with seizures [8]. Osteoporosis increases the likelihood of fractures significantly under the effects of small amounts of stresses and is most likely to be found in elderly patients or those who have low bone density or metabolic bone disorders [7]. Low bone mineral density is one of risk factors for fragility fractures [9].

Table 1: Comparison of Reported Seizure-Induced Acetabular Fractures and the Present Case, Highlighting Fracture Patterns, Underlying Bone Health Abnormalities, Associated Risk Factors and Management Approaches

Reference	Age/Sex	Fracture Pattern	Bone Health/Risk Factors	Management
Ito *et al.* [14]	90 y/o male	Unilateral acetabular fracture with vascular injury	Osteoporosis	Transcatheter arterial embolization for pelvic bleeding
Meena *et al.* [12]	32 y/o male	Bilateral central acetabular fractures	Described as non-osteoporotic	Conservative management
Our case	57 y/o male	Bilateral acetabular + vertebral + upper limb fractures	Severe osteoporosis, adrenal insufficiency	Bilateral acetabular fixation and conservative management of shoulder fractures

In our case, osteoporosis has been assessed via bone mineral density. Survey of 43 physicians in Al Majmaah has revealed deficits in osteoporosis prevention practices [10].

The glucocorticoid excess is a clear contributing factor in the case of fractures. A case of adrenal Cushing syndrome describes recurrent fractures of the vertebrae [11]. In our case, the hypocalcemia, increased parathyroid hormone level and borderline low vitamin D concentration were all important for the bone status assessment. The role of adrenal insufficiency in fracture development and the nature of adrenal nodules in our case remained unclear.

There is certain literature on the issue of acetabular fractures as a result of seizures. The spectrum of clinical manifestations and treatment strategies is described in the literature. Various cases of unilateral and bilateral fractures of the acetabulum after seizures, including episodes without any history of trauma, have been reported [12-14]. Persistent localized pain in the pelvis or hip region after seizures calls for examination for possible injury [13]. Table 1 provides comparative information on selected published cases.

This single case highlights the problem of the timing of fracture detection but the time when individual fractures occurred remained unclear. Our patient suffered osteoporosis unknown prior to the event in question so it is impossible to be sure if any of the fractures of the vertebras occurred prior to seizure. The adrenal nodules were not characterized fully as the patient was referred for tertiary evaluation. A single follow-up appointment in July 2025 made further examination of fracture healing, seizures recurrence, adrenal insufficiency and bone status impossible.

CONCLUSION

When there is severe pain or reduced mobility after the first seizure, it is wise to evaluate for a hidden fracture. When there are multiple fractures that are out of proportion to the cause of injury, it is necessary to assess for osteoporosis and other secondary factors. It was unclear if there were any connections between these three factors in this particular case. Neurological, endocrine and orthopedic exams helped plan patient management and rehabilitation.

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