

An Unusual Traumatic Sacral-U Shape Fracture Occurring during a Grand Mal Epileptic Seizure

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Abstract

Sacral fractures are underdiagnosed and often undertreated. We report the second case of presentation and surgical management of a 56-year-old man with traumatic sacral U-shape fracture secondary to a grand mal epileptic seizure. We then discuss risk factors and mechanism of such fracture in epileptic patients.

Keywords: Sacral-U shape • Fracture • Epilepsy • Spine

Introduction

Sacral fractures are underdiagnosed and often undertreated. Their true incidence is still unknown [1]. Patients with epilepsy have a documented increased risk of fracture approximately twice that of the general population [2], likely resulting both from trauma during seizures and the deleterious effects on bone quality of anticonvulsant medications [3,4]. Additionally, the effect of patients' muscle tetany during seizures may influence injury patterns, as rare injury patterns have been reported in patients with seizures [5]. We report the second case of presentation and surgical management of a patient with traumatic U-shape fracture secondary to a grand mal epileptic seizure.

Case Report

A 56-year-old man arrived at the emergency department. Upon presentation, the patient was in an induced coma. Witness who was the driver reported that the patient was sitting on the front seat passenger with the standard 3-point seat belt attached. Few minutes prior to the seizure, lack of words and confusion was reported. Therefore, the witness-driver decided to conduct the patient to the emergency department when a generalized convulsive seizure occurred during the drive and lasting 4-5 minutes. When the medical assistant arrived, urgent orotracheal intubation was performed and drugs were administered to stop the seizure. The patient was then awakened. Glasgow clinical score was 14/15. He complained from low back pain and saddle anesthesia. No motor deficit was noted. Spinal and brain images were performed. The brain MRI showed multiple areas of enhancement connected to each other by abnormal white matter signal on T2 FLAIR within the left temporal and parietal lobes with corpus callosum infiltration. MR spectroscopy showed an increase in choline/creatine and decrease in NAA.

A multifocal high grade glioma was highly suspected. The Spinal MRI and CT scan (Figure 1) showed a C3 sacral fracture type according to the AO classification system [6]. The patient was taken to surgery the following day for spinal stabilization. A complete excision of the lamina of S1-S2 and S3 was performed. Nerve roots of the cauda equina were therefore

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identified and free. There was no nerve root sectioned. Under fluoroscopic guidance, bilateral pedicle L5-S1 and iliac screw placement was performed. S2 osteotomy was then realized. Distraction and reduction maneuvers under fluoroscopic guidance showed adequate alignment (Figure 2). Five days later, patient underwent biopsy of the brain lesion. Final results were in favor of Glioblastoma.

Post-operative course

Patient was discharged on day 10 after admission. No recurrence of seizure was noted under adequate antiepileptic drug prescription. No motor deficit was noted. He reported improving of sensitivity within his pelvis, but self-polling was still performed.

Discussion

Bone and more specifically spinal fractures are a known but under investigated complications of generalized convulsive seizures. Fractures of the shoulders, thoracic and lumbar vertebrae, the skull and jaw, and the femoral neck are most frequently described [7]. In a study analyzing a large number of 626 consecutive Generalized Convulsive Seizures, Frey et al. [8] estimated the associated risk of Severe Adverse Events at 2.1% per Generalized Convulsive Seizure and 3.2% per patient in whom Generalized Convulsive Seizure were recorded. During the 12-year observation period, seven patients sustained vertebral-body fractures resulting in a risk of 1.1% per Generalized Convulsive Seizure or 1.7% per recorded patient. Remarkably, none of the vertebral-body fractures was associated with a fall, and they occurred spontaneously during the tonic phase of Generalized Convulsive Seizures. Identified risk factors are seizure severity, family history of fractures, and the use of AED known to decrease bone density [9-12]. To the best of our knowledge, this is the second case report of a non-traumatic, seizure induced type C3 sacral fracture according to the AOSpine classification [6]. The first was reported by Wang et al. [13] Anterior lumbosacral spondyloptosis is the most severe category of injury involving the sacrum that was previously reported [14-19]. Our patient had no evidence of osteopenia or osteoporosis, nor any other comorbidity which would have predisposed to sacral fracture. This is supported by the CT scan, which did not suggest any evidence of decreased bone mineral density. This was the first seizure reported by the patient. However, it is challenging to propose an exact mechanism of injury for this patient, since he was sitting on the front seat with an attached seat belt.

Uncommon fracture patterns have previously been described in epileptic patients [20-23], although the sitting position with an attached seat belt in this case was obviously required to produce the observed injury. Nevertheless, the resulting injury pattern of displaced U-type sacral fracture is extremely unusual and the known simultaneous tonic-clonic seizure suggests a large amount of force responsible for this type of fracture. The U-shape sacral fracture is a rare and often unrecognized, unstable fracture pattern. It result from axial loading of



Figure 1. Pre-operative (A) Coronal CT scan showing the U type sacral fracture and (B) Sagittal CT scan showing anterior displacement of the upper fragment and canal narrowing as also visualized on the (C) Sagittal MRI.

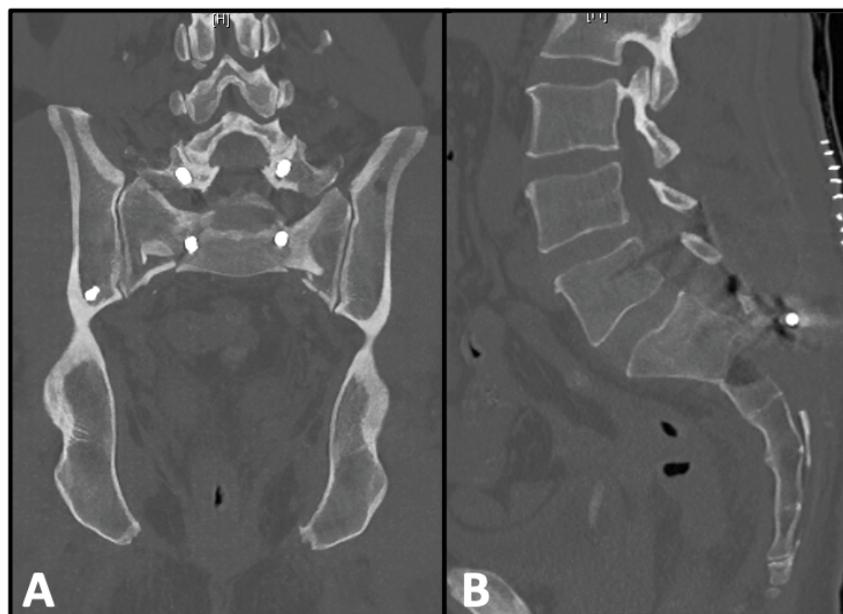


Figure 2. Day 2 post-operative CT scan showing adequate alignment of the fracture on (A) Coronal and (B) Sagittal views with good decompression of the canal regarding S2-S3 after bilateral pedicle L5-S1 and iliac screw placement.

the spine with a significant amount of force and pivoting of the sacrum, leaving the spine and the pelvic ring as two complete dissociated bony structures. It is an injury characterized by bilateral longitudinal sacral fractures and a transverse sacral fracture through the S2 vertebral body. This fracture configuration results in a dissociation between the lumbosacral spine and the pelvis (spino-pelvic injury dissociation). The dissociation causes the lumbosacral spine to flex in relation to the transverse axis of the pelvis, thus increasing the patient's pelvic incidence [24,25]. This fracture pattern is most often described following a high energy injury. Roy-Camille [26] described it as a suicide jumper's fracture as it is often seen in falls from a height. They classified the fracture into three

types. Type 3 as presented by our patient describes an extension fracture with anterior displacement of the upper fragment. The fracture pattern often results in a kyphotic deformity. This is another case demonstrating that bilateral sacral fracture with spino-pelvic dissociation can occur in the absence of significant trauma.

Conclusion

Therefore, clinicians should ask all patients about back pain, pay attention to patients reporting these symptoms spontaneously following GCSs, and

proceed with radiological examinations to prove, or rule out thoracic, lumbar and/or sacral fracture that can sometimes be unstable and compromise neural structures. Sacral-U shape fracture should be systematically suspected in patient with postictal musculoskeletal pain, seizure occurring within sitting position with an attached seat belt and/or risk factors for fractures.

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