

Non-traumatic vertebral fractures: An uncommon complication following the first episode of a convulsive seizure

Nalli Ramanathan Uvaraj, Nalli Ramanathan Gopinath, Aju Bosco

ABSTRACT

Introduction: Non-traumatic vertebral fractures that occur solely as a consequence of the muscle forces that develop during a convulsive seizure, has rarely been reported in orthopedic literature.

Case Report: Therein, we present a case of non-traumatic vertebral compression fractures in an 18-year-old male, who presented with severe back pain following a convulsive seizure, which occurred while he was sitting in his bed. He had no other reported trauma and no previous history of seizure. A detailed neurological work-up revealed no organic cause for the seizure. His bone mineral density measurements, hormonal and metabolic profiles were normal.

Conclusion: Forceful muscle contractions that develop during a single episode of convulsive seizure, occurring for the first time, can result in vertebral compression fractures, even in a normal healthy individual. Vertebral fractures occurring in a healthy young (non-epileptic) male, with normal bone mineral density, presenting with back pain after a convulsive seizure is a rare clinical presentation. These vertebral fractures can appear clinically asymptomatic and can easily be overseen, especially in the absence of overt signs of external trauma and possible postictal consciousness disturbance, which may fail to provide clue to early diagnosis. A high index of clinical suspicion is needed in patients presenting with back pain after a tonic-clonic seizure even in the absence of a fall or a significant trauma. Such patients may be subjected to a systematic musculoskeletal examination and a thorough radiological evaluation to rule out potential bony injuries.



International Journal of Case Reports and Images (IJCRI)



International Journal of Case Reports and Images (IJCRI) is an international, peer reviewed, monthly, open access, online journal, publishing high-quality, articles in all areas of basic medical sciences and clinical specialties.

Aim of IJCRI is to encourage the publication of new information by providing a platform for reporting of unique, unusual and rare cases which enhance understanding of disease process, its diagnosis, management and clinico-pathologic correlations.

IJCRI publishes Review Articles, Case Series, Case Reports, Case in Images, Clinical Images and Letters to Editor.

Website: www.ijcasereportsandimages.com

Non-traumatic vertebral fractures: An uncommon complication following the first episode of a convulsive seizure

Nalli Ramanathan Uvaraj, Nalli Ramanathan Gopinath, Aju Bosco

ABSTRACT

Introduction: Non-traumatic vertebral fractures that occur solely as a consequence of the muscle forces that develop during a convulsive seizure, has rarely been reported in orthopedic literature. **Case Report:** Therein, we present a case of non-traumatic vertebral compression fractures in an 18-year-old male, who presented with severe back pain following a convulsive seizure, which occurred while he was sitting in his bed. He had no other reported trauma and no previous history of seizure. A detailed neurological work-up revealed no organic cause for the seizure. His bone mineral density measurements, hormonal and metabolic profiles were normal. **Conclusion:** Forceful muscle contractions that develop during a single episode of convulsive seizure, occurring for the first time, can result in vertebral compression fractures, even in a normal healthy individual. **Vertebral fractures occurring in a healthy young (non-epileptic) male, with normal bone**

mineral density, presenting with back pain after a convulsive seizure is a rare clinical presentation. These vertebral fractures can appear clinically asymptomatic and can easily be overseen, especially in the absence of overt signs of external trauma and possible postictal consciousness disturbance, which may fail to provide clue to early diagnosis. A high index of clinical suspicion is needed in patients presenting with back pain after a tonic-clonic seizure even in the absence of a fall or a significant trauma. Such patients may be subjected to a systematic musculoskeletal examination and a thorough radiological evaluation to rule out potential bony injuries.

Keywords: Seizure, Epilepsy, Non-traumatic, Vertebral fracture

How to cite this article

Uvaraj NR, Gopinath NR, Bosco A. Non-traumatic vertebral fractures: An uncommon complication following the first episode of a convulsive seizure. *International Journal of Case Reports and Images* 2014;5(2):135–139.

doi:10.5348/ijcri-2014-02-458-CR-10

Nalli Ramanathan Uvaraj¹, Nalli Ramanathan Gopinath², Aju Bosco³

Affiliations: ¹MS (Orth), DNB, Professor of Spine Surgery, Spine Unit, Institute of Orthopaedics and Traumatology, Rajiv Gandhi Government General Hospital and Madras Medical College, Chennai-3, Tamil Nadu, India; ²DNB, Assistant Professor of Orthopaedics, Institute of Orthopaedics and Traumatology, Rajiv Gandhi Government General Hospital and Madras Medical College, Chennai-3, Tamilnadu, India; ³MS (Orth), Assistant Professor of Orthopaedics, Department of Orthopaedics and Traumatology, Government Mohan Kumaramangalam Medical College and Superspeciality Hospital, Salem, Tamil Nadu, India.

Corresponding Author: Dr. Aju Bosco, 219/3A, Rajaveethi, Gandhi Road, South Kattur, Tiruchirappalli, Tamil Nadu, India 620019; Ph: +919443456190; Email: drboscos@yahoo.com

Received: 26 June 2013

Accepted: 26 July 2013

Published: 01 February 2014

INTRODUCTION

Vertebral fractures occur in patients with convulsive seizures. It has been reported in literature that the incidence of vertebral fractures associated with convulsive seizures varies from 0.95–16% [1, 2]. These fractures usually result from trauma due to a fall or accident occurring during the seizure. These patients have an associated osteopenia induced by long-term anticonvulsive medications or other bone mineral density decreasing agents. However, non-traumatic

vertebral fractures that occur from violent contraction of the paraspinal muscles during a convulsive seizure is very rare (0.3%) [3]. Non-traumatic vertebral fractures that occur solely as a consequence of the muscle forces that develop during a convulsive seizure, has rarely been reported in orthopedic literature.

We present a case of non-traumatic vertebral compression fracture in a healthy young male, with normal bone mineral density. The patient is not a known epileptic and had experienced the first episode of a convulsive seizure.

CASE REPORT

An 18-year-old male presented to the medical department with a history of fever with chills and rigor and loss of appetite for one week. In the night after admission, he developed an episode of generalized tonic-clonic seizure for the first-time while sitting on his couch, during the early morning hours. His mother was a witness to the seizure. There was no history of overt trauma as reported by his mother. The patient had no history of previous seizure episodes and a detailed history in this regard also did not throw light as to the cause of the seizure. Next morning, the patient complained of mild back pain and chest pain which were ignored due to the absence of any signs of significant external trauma. His neurologic examination was unremarkable. As the back pain persisted on the third day, the patient was referred to the orthopedic department for further evaluation. A thorough musculoskeletal examination revealed a paraspinal muscle spasm and tenderness in the middorsal region with no obvious deformity. Plain radiographs showed loss of height of D5 and D6 vertebrae (Figure 1A–B). Magnetic resonance imaging (MRI) scan confirmed compression fractures of D5, D6, D7 and D8 vertebrae (Figure 2). His hormonal and metabolic profiles and bone mineral density were normal. A detailed neurological work-up (computed tomography scan of the brain and electroencephalogram) revealed no organic cause for the seizure. The patient was fitted with a thoracolumbar orthotic support. Pain at the fracture site subsided after two weeks when rehabilitation was started, following which the patient resumed normal activities. Radiographs taken at follow-up showed that his spine was stable with no further loss of vertebral body height and no progression of kyphosis (Figure 3A–B). Patient was kept on antiseizure medication and was followed-up periodically. On regular follow-up there had been no further episode of seizures for the last four years.

DISCUSSION

In 1907, Lehndorff was the first to suggest that strong muscle contractions during a convulsive seizure can cause vertebral compression fractures [4]. Violent contractions



Figure 1: (A) Anteroposterior plain radiograph of the dorsolumbar spine, showing a loss of height of D5, D6 and D7 vertebral bodies, (B) Lateral plain radiograph of the dorsolumbar spine showing a loss of height of D5, D6 and D7 vertebrae (white arrows).



Figure 2: T2-weighted magnetic resonance imaging scan of the dorsolumbar spine showing compression fractures of the D5, D6, D7 vertebral bodies and fracture of the superior end plates of D5, D6, D7 and D8 vertebrae (white arrows). There is no spinal canal narrowing or cord edema at the level of the fracture.

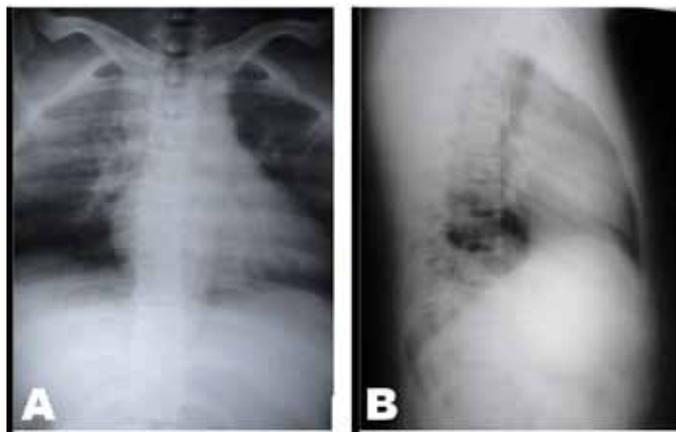


Figure 3: (A) Follow-up anteroposterior plain radiographs of the dorsolumbar spine showing no further loss of height of the vertebral bodies, (B) Lateral radiographs (at follow-up), showing no further progression of kyphosis of the dorsal spine.

of the paraspinal muscles and the muscles of the neck, abdomen and pelvis, occur during convulsive seizures. With increasing muscular tension of the posterior spinous and abdominal muscles, the spine flexes forward and is subjected to axial loading and flexion compressive forces, directed along the anterior and middle columns, which can cause vertebral compression or burst fractures [5, 6]. For biomechanical reasons, seizure induced non-traumatic vertebral fractures have a predilection for the mid-thoracic spine (T3–T8), as in this case [6, 7]. In contrast traumatic vertebral fractures affect the cervical, thoracolumbar or lumbosacral junction. Cervical fracture and lumbosacral dislocation have been documented on rare occasions [8]. Most vertebral fractures induced by seizure are inherently stable with no neurological deficit.

Vertebral fractures are most frequent in patients whose attacks occur during sleep and in patients with a history of convulsive status epilepticus [7]. There has been a previous case report of a vertebral compression fracture which was the only presenting feature of an unwitnessed nocturnal convulsive seizure [4]. But in this case report, the mother witnessed the tonic-clonic seizure which occurred during the early morning hours, which was the only and the most valuable clinical clue to the diagnosis. Most vertebral fractures (80.9%) resulted from recurrent convulsions, due to a repetitive additive mechanism in patients with a history of convulsive status epilepticus [5]. But this is a case of a non-epileptic who was presented with a vertebral compression fracture from the first episode of convulsive seizure.

There have been reports of non-traumatic vertebral fractures in convulsive seizures secondary to osteopenia induced by long-term anticonvulsive medications or other bone mineral density decreasing agents, diabetic hypoglycemia, electrolyte imbalance, hypocalcaemia, electroconvulsive therapy or trauma during the convulsive episode [1, 9–11]. Patients with increased muscle mass, anticonvulsant induced osteoporosis, a prolonged seizure

or recurrent seizures are at increased risk for fractures [1, 7]. Our patient was not a known epileptic and was not on anticonvulsive medication. His bone mineral density was normal. This is a rare case of a vertebral compression fracture that occurred in a normal healthy individual during the first episode of a convulsive seizure. Hence, the fracture was the sole result of violent muscle contractions alone that occurred during tonic-clonic convulsion. Vertebral fractures occurring in a healthy young (non-epileptic) male, with normal bone mineral density, presenting with back pain after a convulsive seizure is a rare clinical presentation which could easily be missed unless there is a high index of clinical suspicion.

Vasconseles suggested a rate of 15% of primarily asymptomatic fractures caused by seizures [7]. This emphasizes the importance of a critical musculoskeletal examination and a radiographic assessment in patients presenting with back pain after a tonic-clonic seizure even if an event of fall or accident is neglected by the patient. In a young patient, absence of overt signs of trauma, postictal amnesia or an inadequate clinical history provided by the patient or family members may mislead the clinician into the evaluation of a spontaneous non-traumatic spine fracture which is often equated with a metabolic disorder or metastasis [4]. This may lead to an unnecessary costly diagnostic work-up.

CONCLUSION

Forceful muscle contractions during a single episode of convulsive seizure occurring for the first time, can result in vertebral compression fracture, even in a normal healthy individual. These vertebral fractures can appear clinically asymptomatic and can easily be overseen due to absence of external trauma and also due to possible postictal consciousness disturbance, which may fail to provide clue to early diagnosis. A high degree of clinical suspicion is needed whenever an epileptic patient complains of back pain. Such patients may be subjected to a thorough radiological evaluation to rule out potential bony injury, especially in the presence of symptoms.

Author Contributions

Nalli Ramanathan Uvaraj – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Nalli Ramanathan Gopinath – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Aju Bosco – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final

approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

Copyright

© Nalli Ramanathan Uvaraj et al. 2014; This article is distributed under the terms of Creative Commons attribution 3.0 License which permits unrestricted use, distribution and reproduction in any means provided the original authors and original publisher are properly credited. (Please see www.ijcasereportsandimages.com/copyright-policy.php for more information.)

REFERENCES

1. Kelly JP. Fracture complicating electro-convulsive therapy and chronic epilepsy. *J Bone Joint Surg Br* 1954;36-B(1):70–9.
2. Pederson KK, Christiansen C, Ahlgren P, Lund M. Incidence of fracture of the vertebral spine in epileptic patients. *Acta Neurol Scand* 1976;54(2):200–3.
3. Finelli PF, Cardi JK. Seizure as a cause of fracture. *Neurology* 1989;39(6):858–60.
4. Aboukasm AG, Smith BJ. Nocturnal vertebral compression fracture. A presenting feature of unrecognized epileptic seizures. *Arch Fam Med* 1997;6(2):185–7.
5. McCullen GM, Brown CC. Seizure-induced thoracic burst fractures: A case report. *Spine* 1994;19(1):77–9.
6. Youssef JA, McCullen GM, Brown CC. Seizure-induced lumbar burst fracture. *Spine* 1995;20(11):1301–3.
7. Vasconcelos D. Compression fractures of the vertebrae during major epileptic seizures. *Epilepsia* 1973;14(3):323–8.
8. Takahashi T, Tominaga T, Shamoto H, Shimizu H, Yoshimoto T. Seizure-induced thoracic spine compression fracture: Case report. *Surg Neurol* 2002;58(3-4):214–6.
9. Aydmer Kalaci, Mehmet Duru, Sinem Karazincir, Teoman Toni Sevinc, Guven Kuvandik, Ali Balci. Thoracic spine compression fracture during Isoniazid-induced seizures: A case report. *Paediatric Emergency Care* 2008;24(12):842–4.
10. Malik SA, Mitra A, Bashir K, Mahapatra A. Lumbar spine burst fracture as a result of hypoglycaemia induced seizure. Case report. *Injury Extra* 2011;42:25–8.
11. Mattson RH, Gidal BE. Fractures, epilepsy, and antiepileptic drugs. *Epilepsy Behav* 2004;5(Suppl 2):S36–40.

ABOUT THE AUTHORS

Article citation: Uvaraj NR, Gopinath NR, Bosco A. Non-traumatic vertebral fractures: An uncommon complication following the first episode of a convulsive seizure. *International Journal of Case Reports and Images* 2014;5(2):135–139.



Nalli Ramanathan Uvaraj is Professor of Spine Surgery at Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai 600003, India. His research interests include Spinal Trauma, Tuberculosis of Spine and Spinal deformities. He intends to pursue PhD in future. He has published 32 research papers in academic journals.



Nalli Ramanathan Gopinath is Assistant Professor of Orthopaedics at the Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai 600003, India. His research interests include Spine Surgery, Trauma and Limb Reconstruction. He intends to pursue Spine Surgery in future. He has published six research papers in academic journals.



Aju Bosco is a resident at Spine Surgery Unit, Institute of Orthopaedics and Traumatology, Madras Medical College, Chennai, India. His research interests include Basic Sciences, Spine Deformities, Stem Cell Research and Minimally Invasive Spine Surgery. He intends to pursue Specialization in Spine Surgery and Spinal Deformity Correction in Future. He has made national and international presentations and published research papers in academic journals.

Access full text article on
other devices



Access PDF of article on
other devices



Edorium Journals: An introduction

Edorium Journals Team

About Edorium Journals

Edorium Journals is a publisher of high-quality, open access, international scholarly journals covering subjects in basic sciences and clinical specialties and subspecialties.

Invitation for article submission

We sincerely invite you to submit your valuable research for publication to Edorium Journals.

But why should you publish with Edorium Journals?

In less than 10 words - we give you what no one does.

Vision of being the best

We have the vision of making our journals the best and the most authoritative journals in their respective specialties. We are working towards this goal every day of every week of every month of every year.

Exceptional services

We care for you, your work and your time. Our efficient, personalized and courteous services are a testimony to this.

Editorial Review

All manuscripts submitted to Edorium Journals undergo pre-processing review, first editorial review, peer review, second editorial review and finally third editorial review.

Peer Review

All manuscripts submitted to Edorium Journals undergo anonymous, double-blind, external peer review.

Early View version

Early View version of your manuscript will be published in the journal within 72 hours of final acceptance.

Manuscript status

From submission to publication of your article you will get regular updates (minimum six times) about status of your manuscripts directly in your email.

Our Commitment

Six weeks

You will get first decision on your manuscript within six weeks (42 days) of submission. If we fail to honor this by even one day, we will publish your manuscript free of charge.

Four weeks

After we receive page proofs, your manuscript will be published in the journal within four weeks (31 days). If we fail to honor this by even one day, we will publish your manuscript free of charge and refund you the full article publication charges you paid for your manuscript.

Mentored Review Articles (MRA)

Our academic program "Mentored Review Article" (MRA) gives you a unique opportunity to publish papers under mentorship of international faculty. These articles are published free of charges.

Most Favored Author program

Join this program and publish any number of articles free of charge for one to five years.

Favored Author program

One email is all it takes to become our favored author. You will not only get fee waivers but also get information and insights about scholarly publishing.

Institutional Membership program

Join our Institutional Memberships program and help scholars from your institute make their research accessible to all and save thousands of dollars in fees make their research accessible to all.

Our presence

We have some of the best designed publication formats. Our websites are very user friendly and enable you to do your work very easily with no hassle.

Something more...

We request you to have a look at our website to know more about us and our services.

We welcome you to interact with us, share with us, join us and of course publish with us.



Edorium Journals: On Web



Browse Journals

CONNECT WITH US

