

# Nontraumatic Acetabular Fracture Sustained during Convulsive Seizure Following Surgery for an Unruptured Intracranial Aneurysm: A Case Report

Hirofumi Iwamoto,<sup>1</sup> Kazuhiro Nakamura,<sup>1</sup> Daisuke Watanabe,<sup>1</sup> Kiyoyuki Yanaka,<sup>1</sup> Takeshi Ainoya,<sup>2</sup> and Tetsuya Yamamoto<sup>3</sup>

Acetabular fracture usually is related to high-energy traumatic injury or falls from heights and directly caused by seizures without trauma is extremely rare. We report a 71-years-old man who sustained a left acetabular fracture secondary to generalized seizure after clipping of an unruptured aneurysm without trauma and any risk for fracture. The patient had an aneurysm was arising from the bifurcation of the left internal carotid artery and the posterior communicating artery. After the clipping, the patient had three times tonic-clonic seizures for 1 min and resulted in an acetabular fracture. In our case, acetabular fracture might relate to expose of massive stress generated by strong muscle contraction. Acetabular fracture causes severe complication, such as pelvic hemorrhage and organ injury. Therefore, early recognition and diagnosis of such fracture and risk factor provide an opportunity to secure a better outcome.

**Keywords:** acetabular fracture, cerebral aneurysm, seizure

## Introduction

The risk of seizures after surgery for intracranial aneurysm has been reported to be 0% and 15.7%.<sup>1)</sup> Fracture directly caused by seizures without trauma are extremely rare and have been reported to occur in 0.3% of all such seizures.<sup>2)</sup> We report the case of patient who sustained a left acetabular fracture secondary to generalized seizure after clipping of an unruptured aneurysm without trauma.

## Case Report

A 71-year-old man was referred to our hospital for treatment of an unruptured cerebral aneurysm. The aneurysm was

arising from the bifurcation of the left internal carotid artery and the posterior communicating artery. The aneurysm had gradually enlarged, being 5 mm in diameter on admission. The patient who had cerebral infarction in the left temporal lobe had no history of epilepsy. The patient was not taking medication that affects bone density.

Surgical clipping via a left pterional craniotomy was performed, and the aneurysm was successfully obliterated without unnecessary brain retraction which means that brain damage was expected to be minimum. Therefore, we did not intend to use antiepileptic medication. The patient became alert soon after the surgery and was observed in the intensive care unit. Three hours after the surgery, the patient had three times tonic-clonic seizures for 1 min. The seizures stopped spontaneously and were treated by intravenous phenytoin 250 mg after first and third seizures. The seizures were controlled intravenous phenytoin 250 mg and oral administration 200 mg. Computed tomography (CT) after the seizures did not reveal any abnormality, despite disturbance of consciousness has been prolonged. Three days after the surgery, the patient became conscious and started to complain of left pelvic pain. A pelvic X-ray (Figs. 1A and 1B) and CT (Figs. 2A and 2B) revealed a left acetabular fracture. In the absence of trauma, we suspected seizures as causative factor. There was no massive hemorrhage, dislocation or organ injury on pelvic CT (Figs. 3A and 3B). The patient was evaluated and managed conservatively under the supervision of an orthopedic surgeon. Computed tomography and X-ray did not indicate osteoporotic change. The patient remained non-weight-bearing for 2 weeks and underwent physiotherapy. About 3 months after the surgery, he was discharged without disability.

Postoperative hematological examination showed that calcium level was 9.0 mg/dl, albumin level was 3.2 g/dl, and inorganic phosphorus level was 3.3 mg/dl. Bone density also was normal level. He was not in osteoporotic condition.

## Discussion

Postoperative seizures are well-known complication because operative procedures result in brain injury.<sup>1)</sup> In the study by Baker et al.,<sup>3)</sup> the overall postoperative seizure rate was 5.4%; patient without ruptured aneurysm occupied who experienced early postoperative seizures (within 2 weeks of the surgery) accounted for 2.6% of the patients.

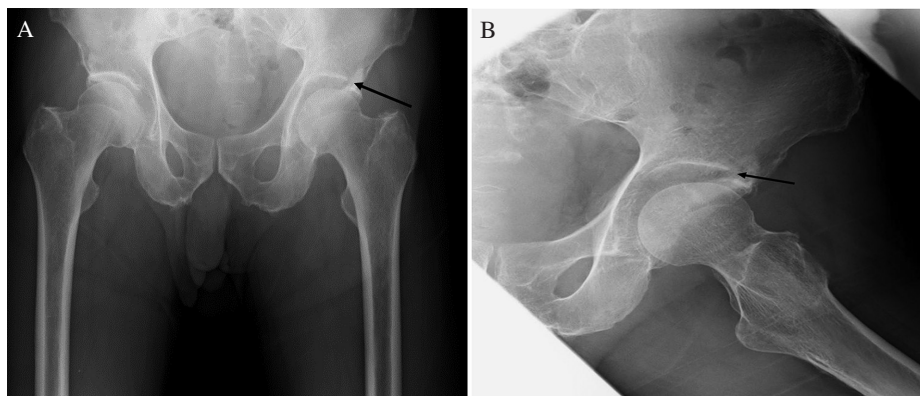
<sup>1</sup>Department of Neurosurgery, Tsukuba Memorial Hospital, Tsukuba, Ibaraki, Japan

<sup>2</sup>Department of Orthopedics, Tsukuba Memorial Hospital, Tsukuba, Ibaraki, Japan

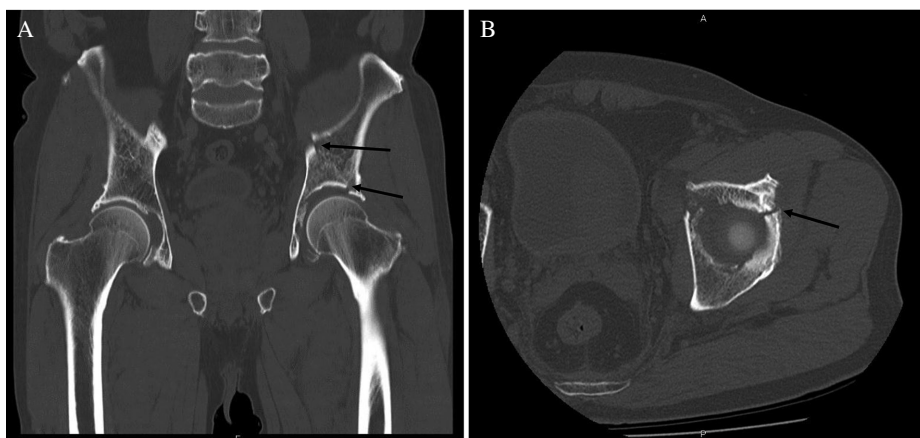
<sup>3</sup>Department of Neurosurgery, Faculty of Medicine, University of Tsukuba, Tsukuba, Ibaraki, Japan

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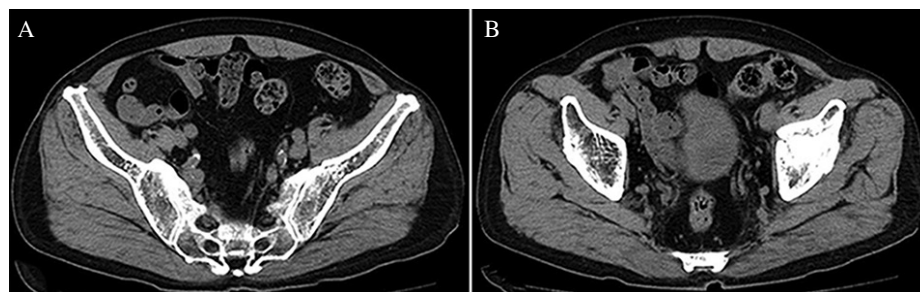
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**Fig. 1** A pelvic X-ray demonstrates fracture of superior margin of left acetabular (arrow). (A) Frontal view, (B) Left lauenstein view.



**Fig. 2** Pelvic CT demonstrates fracture from left acetabular to ileum without dislocation (arrow). (A) Coronal view, (B) Axial view.



**Fig. 3** Pelvic CT demonstrates that massive hemorrhage and organ damage are not seen. (A) CT at level of ilium, (B) CT at level of bladder.

O'Donnell et al.<sup>1)</sup> reported the risk of seizure after surgery for unruptured intracranial aneurysms to be very low. They found several factors, such as preoperative seizure, middle cerebral artery aneurysm and modified Rankin scale >1 at 12 months increased risk of postoperative seizure. They focused on other factors, such as history of stroke, craniotomy, ruptured aneurysm and multiple aneurysms. However, those did not relate to increase risk of seizure. In our patient with temporal old infarction, we suspected that the surgical intervention for the cerebral aneurysm affected left temporal lobe and decreased his seizure threshold. When the old cerebral infarction exists ipsilateral to aneurysm, it is possible that surgical intervention might trigger seizure. In that case, it seems to consider postoperative antiepileptic medication for prevention.

Fractures are uncommon complication of seizures and are extremely rare in the absence of trauma. Finelli et al.<sup>4)</sup> reported

that 1.1% of patients who had seizures sustained fracture. The fractures were due to direct trauma in 0.5% and to the seizure alone in 0.3% of those patients.<sup>4)</sup> Fractures related to seizures include fracture of the skull, nasal bone, and clavicle in trauma, while proximal humerus was common in nontrauma.<sup>2)</sup> Acetabular fracture is usually related to high-energy traumatic injury or falls from heights.<sup>2,4-8)</sup> Acetabular fractures after seizures without direct trauma are extremely rare.

Bone fracture is defined as a damage continuity of the bone result of direct or indirect force.<sup>9)</sup> The mechanism of acetabular fracture involves the force is transmitted along a femur against to acetabulum in knee flexion or extension position. For example, there is dashboard fracture which caused by hitting a knee and force is transmitted to acetabulum and pelvis. In our case, we suspected that the mechanism of fracture involves massive muscle contraction medially against to acetabulum.<sup>2,5-7)</sup> Furthermore, the patient repeated

**Table 1** Summary of acetabular fracture sustained during a seizure direct trauma

| No. | Author  | Age | Sex | Seizure     | Fracture   | Cause of seizure/clinical feature                 | Risk factor for fracture | Complication             | Outcome |
|-----|---|-----|-----|-------------|------------|---|--------------------------|--------------------------|---------|
| 1   | Takahashi et al. (2007) <sup>7)</sup>                 | 45  | M   | Generalized | Bilateral  | Antibiotics cefotaximu allergy                    |                          | Pelvic hemorrhage        | GR      |
| 2   | Granhed and Karladani (1997) <sup>5)</sup>            | 74  | M   | Generalized | Bilateral  | Cerebral infarction                               |                          | Pelvic hemorrhage        | MD      |
| 3   | Granhed and Karladani (1997) <sup>5)</sup>            | 84  | M   | Generalized | Bilateral  | Cerebral infarction                               |                          |                          | MD      |
| 4   | Nehme et al. (2012) <sup>6)</sup>                     | 68  | M   | Generalized | Bilateral  | Cerebellar hemangioma                             |                          | Pelvic hemorrhage        | D       |
| 5   | Mader et al. (2006) <sup>8)</sup>                     | 74  | M   | Generalized | Unilateral | n.d   |                          |                          | unknown |
| 6   | Mader et al. (2006) <sup>8)</sup>                     | 86  | F   | Generalized | Unilateral | Transient ischemic attack                         |                          |                          | unknown |
| 7   | Park et al. (2013) <sup>2)</sup>                      | 73  | F   | Unknown     | Unilateral | Myelography contrast allergy                      | Osteoporosis             |                          | GR      |
| 8   | Friedberg and Buras (2005) <sup>11)</sup>             | 71  | M   | Generalized | Bilateral  | Cerebral infarction                               |                          |                          | GR      |
| 9   | Berman (1993)   | 54  | F   | Generalized | Unilateral | n.d   |                          | Renal insufficiency      | GR      |
| 10  | Duus (1986) <sup>10)</sup>                            | 35  | M   | Generalized | Unilateral | n.d   |                          | Antiepileptic medication | GR      |
| 11  | Ribacoba-Montero and Salas-Puig (1997) <sup>12)</sup> | 75  | M   | Generalized | Unilateral | Intoxication                                      |                          |                          | SD      |
| 12  | Sikkink (2000)  | 77  | M   | Generalized | Unilateral | Cerebral infarction                               |                          |                          | SD      |
| 13  | Eastwood et al. (1978) <sup>13)</sup>                 | 27  | F   | Localized   | Bilateral  | Myelography contrast complication                 | Pregnancy                | Pelvic hemorrhage        | MD      |
| 14  | Tillman M. Moore (1970)                               | 43  | M   | Generalized | Unilateral | Postoperative for Dupuytren's contracture         |                          |                          | unknown |
| 15  | Bulent Atilla (2008)                                  | 33  | M   | Generalized | Unilateral | n.d   |                          | Renal insufficiency      | GR      |
| 16  | Iwamoto (2016)  | 71  | M   | Generalized | Unilateral | Cerebral infarction, unruptured cerebral aneurysm |                          |                          | GR      |

D: Dead, F: Female, GR: Good recovery, M: Male, MD: Moderate disability, SD: Severe disability.

generalized seizure, the left acetabulum was exposed to stress three-times generated by muscle contraction around hip and femur.

To the best of our knowledge, only 16 cases including ours have been reported (Table 1). The mean age of the patients in those cases were 61.9 years. Older adults seem to be particularly vulnerable to fractures, owing to age-related declines in bone mineral density. In six of the reported acetabular fracture cases, the fracture was a bilateral one.

The causative factor of seizures was different and included idiopathic epilepsy,<sup>10)</sup> cerebrovascular disease,<sup>5,8,11)</sup> contrast media allergy,<sup>2)</sup> cerebellar hemangioma,<sup>6)</sup> antibiotic allergy<sup>7)</sup> and intoxication.<sup>12)</sup> Three of the patients had metabolic bone disease due to osteoporosis, antiepileptic medication or pregnancy.<sup>2,10,13)</sup> Two patients had renal insufficiency, which may have caused the bone to become fragile. Four patients had pelvic hemorrhage.<sup>5-7,13)</sup> All of the patients were conservatively treated and had a good outcome, but they required long-term rehabilitation. In addition, one patient died of septic shock. Therefore, we would encourage physicians to promptly

consider this rare but potentially debilitating complication following seizures in older patients, because early diagnosis is essential to secure the best functional outcome.

## Conclusion

Acetabular fractures related to seizures are extremely rare. This severe complication may lead to sudden death; therefore, early recognition and diagnosis provides an opportunity to secure the best outcome. Furthermore, it is important to understand the patient's background, such as any comorbidity that may be associated with an increased risk of seizures and fractures.

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## Conflicts of Interest Disclosure

All authors declare no conflict of interest in this report.

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Corresponding author:

Hirofumi Iwamoto, Department of Neurosurgery, Tsukuba Memorial Hospital, 1187-299 Kaname, Tsukuba, Ibaraki 300-2622, Japan.

✉ hirofumi\_neurosurgery@yahoo.co.jp