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Paraplegia Caused By Vertex Epidural Hematoma and Lumbal L1 Burst Compression Fracture: A Rare Case Report

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Abstract: Paraplegia is most commonly caused by spinal cord trauma and is rarely the result of head injury. In this case report, we present a rare case of paraplegia caused by a vertex epidural hematoma (EDH) and L1 burst compression fracture. A 55-year-old female patient was diagnosed with vertex-parietal right EDH, right and left parietal subarachnoid hemorrhage (SAH), traumatic cerebral edema, open depressed comminuted fracture of the vertex, linear fracture of the right parietal bone, L1 compression fracture, and lower limb paraplegia. The patient underwent emergency debridement, craniotomy for EDH evacuation, reconstruction, and intracranial pressure (ICP) monitoring. One week after the craniotomy, L1 decompression and stabilization fusion were performed. The patient showed clinical improvement, received rehabilitation, and was discharged after 11 days of hospitalization. We conclude that paraplegia can be caused by vertex EDH and L1 compression fracture. Accurate diagnosis and appropriate management can lead to a favorable prognosis.

Keywords: *Paraplegia, Vertex EDH, Burst Compression Fracture, Craniotomy*

INTRODUCTION

Head injury is one of the leading causes of morbidity and mortality worldwide. Common causes of head injury include falls from height, traffic accidents, physical assault, and others. The incidence of skull fractures in head injury cases is also very high, with the parietal bone being the most frequently affected, followed by the temporal, occipital, and frontal bones. (Syed AA., et al. 2012) Many studies have described the relationship between head injuries and spinal injuries. However, when a moderate to severe head injury affects consciousness, it may lead to misdiagnosis of either trauma. The incidence of cervical spine injuries in head trauma cases is approximately 4%–8%, while the overall incidence of spinal injuries in head trauma cases ranges from about 5%–15%. (Oliveira A., et al. 2011) Paraplegia is most commonly caused by spinal trauma, degenerative diseases, tumors, and

infections. Although rare, multiple sclerosis, meningioma, and vertex epidural hematoma (EDH) can also cause paraplegia. (Matsumura H., et al. 2016) Vertex EDH is an uncommon complication of head injury, occurring in only about 18% of such cases. (Gader G., et al. 2023) In this case report, we present a case of paraplegia caused by two distinct conditions: vertex EDH and L1 burst compression fracture, managed operatively at Klungkung Regional General Hospital, Bali.

Case Presentation

A 55-year-old female patient presented to the emergency department with an open head wound and lower limb weakness after being struck by a falling bamboo ladder while picking durians in an orchard. Mechanism of injury: the bamboo ladder had not been securely fastened and was pulled from above by the patient's husband, causing it to fall and hit the patient's head. She then fell backward, and landing on her back. The patient briefly lost consciousness for less than five minutes. There was no projectile vomiting. Primary survey findings: airway was clear, spontaneous breathing present, blood pressure 110/70 mmHg, heart rate 88 bpm, warm extremities, consciousness was compos mentis with a Glasgow Coma Scale (GCS) of E4V5M6, and axial temperature was 36.7°C. Physical examination revealed an open wound in the right parietal region measuring 5x1 cm, with exposed bone, palpable crepitus, and a depressed area. There was no visible trauma to the neck, thorax, or back. Neurological examination showed upper limb motor strength 5/5 in all muscle groups bilaterally, lower limb motor strength of 0000/0000 bilaterally. Upper-limb sensation was intact, while lower-limb sensation was absent.

CT scan of the head revealed an open depressed comminuted vertex fracture, a linear fracture of the right parietal bone (Figures 1), vertex-parietal epidural hematoma (EDH), right and left parietal subarachnoid hemorrhage (SAH), and traumatic cerebral edema (Figures 2). Lumbosacral X-ray (AP/lateral) showed an L1 compression fracture (Figures 3). Chest X-ray showed no abnormalities (Figure 4). The patient underwent emergency debridement, craniotomy for EDH evacuation, reconstruction, and ICP monitoring. During surgery, an EDH with a thickness of approximately 1.5 cm and a volume of about 40 cc was found and evacuated. Three days postoperatively, the patient began to regain motor function in her lower limbs with strength graded at 2222/1111. On the fourth day, a CT scan of the lumbosacral spine was performed (Figure 5). On the seventh postoperative day, the patient underwent decompression and stabilization fusion at L1. Postoperative care continued for three more days, after which the patient was discharged and scheduled for routine follow-up at the outpatient clinic.

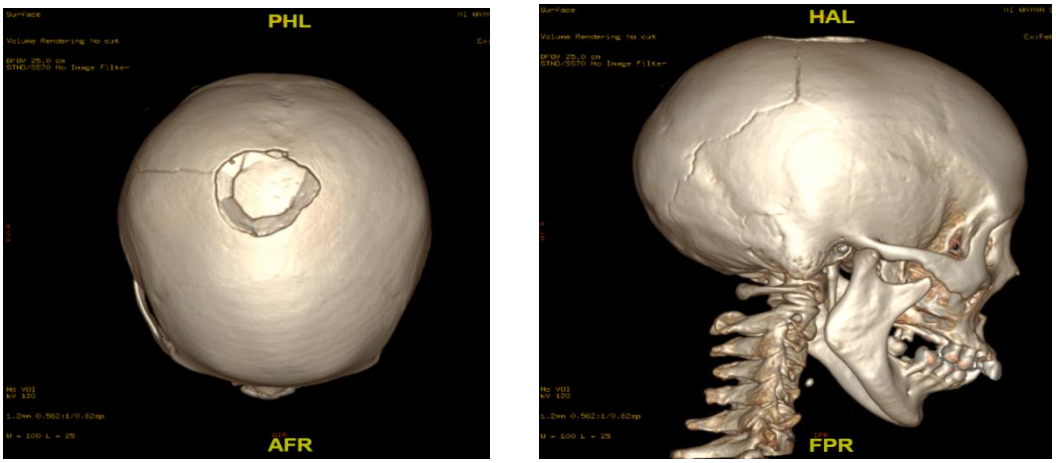
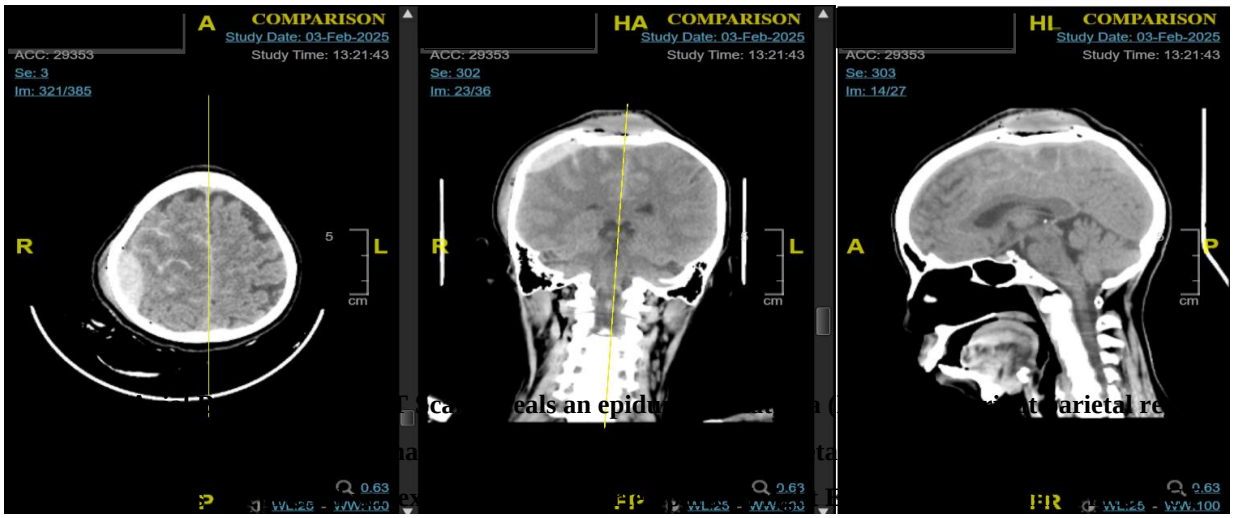


Figure 1. 3D Head CT Scan shows a depressed vertex fracture and a linear fracture of the right parietal bone.



Scan shows SAH in the right and left parietal regions.

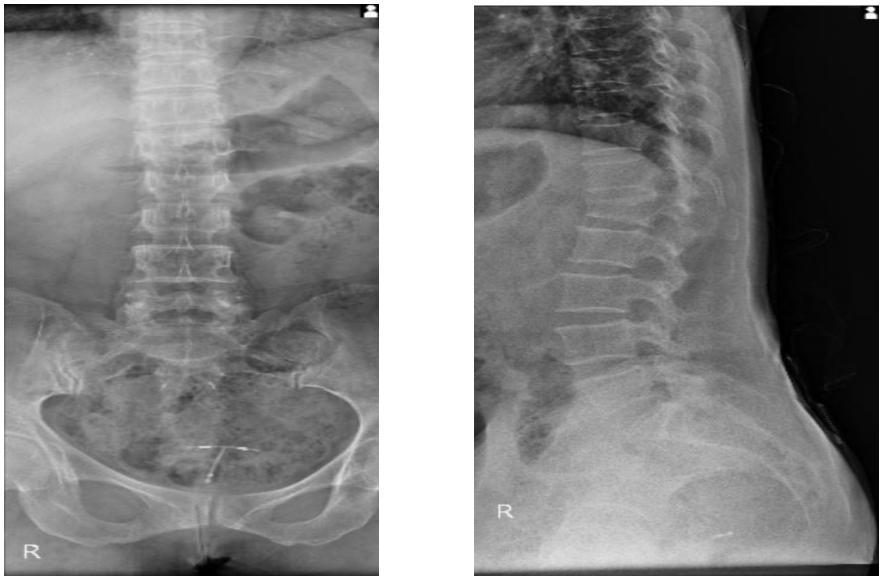


Figure 3. Lumbosacral X-ray (AP/Lateral views) shows a compression fracture of L1.

Figure 4. Thoracic X-ray (AP view) shows no abnormalities in the thoracic bones.

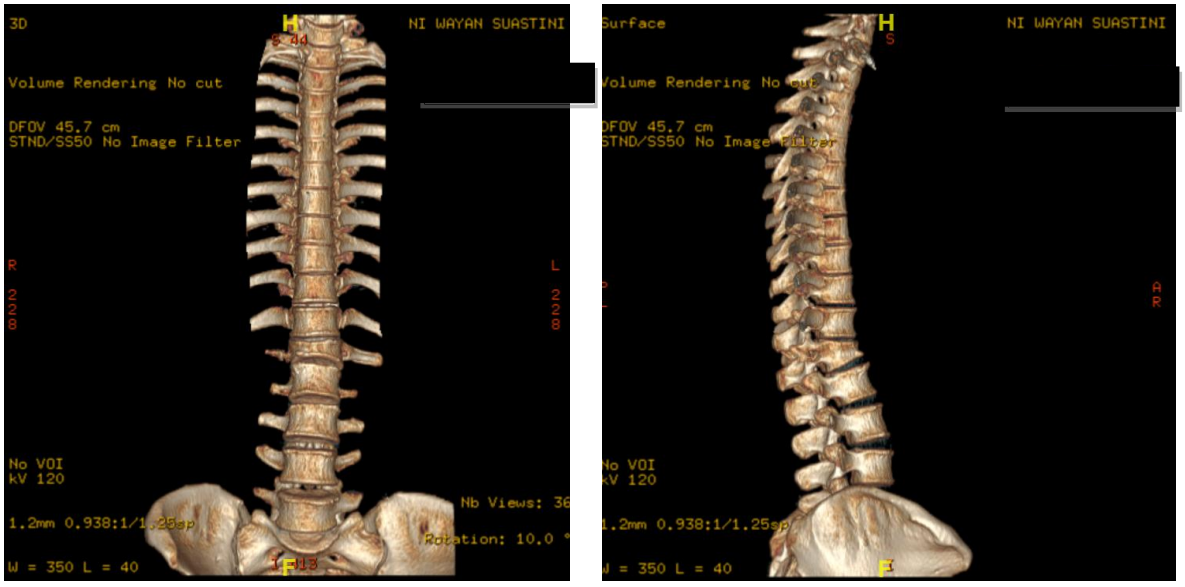
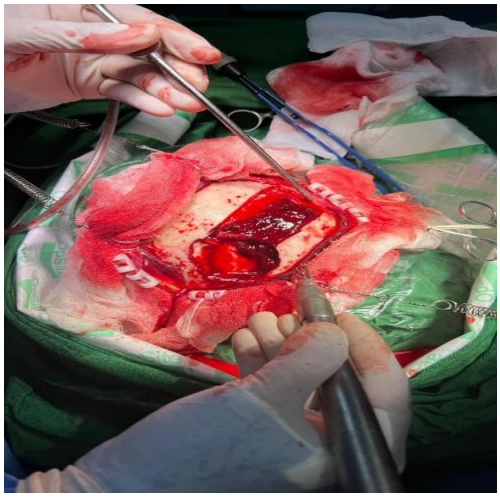
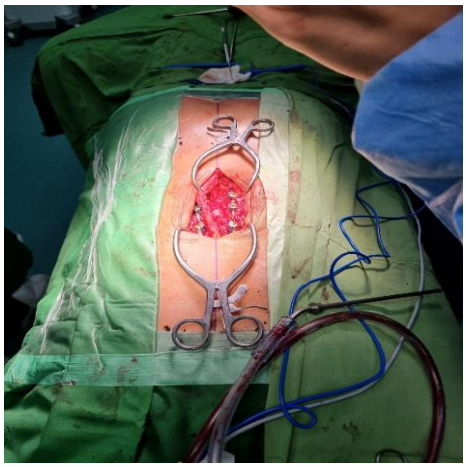


Figure 5. Lumbosacral CT Scan (Postoperative Day 4) shows a burst compression fracture at L1.





RESULT AND DISCUSSION

Head and spinal injuries are common cases in the field of neurosurgery. Vertex epidural hematoma (EDH) is a specific presentation of epidural hematoma, often caused by traumatic injury. According to several sources we reviewed, only a few case reports discuss vertex EDH, as this condition is extremely rare. Wylen and Nanda reported that among all intracranial hematoma cases, 1.3%–8.2% were vertex EDH. (Wylen EL, et al. 1998) Ramesh reported an incidence of 0.024% for head injuries and 0.47% for epidural hematomas. (Ramesh V., et al. 2014) The clinical presentation of vertex EDH can vary. Pain is the most common symptom. (Klepinowski T., et al. 2020) Headache is caused by several factors, such as direct dural irritation due to detachment along the superior sagittal sinus, as the dura in this area is richly innervated by sensory fibers. Increased intracranial pressure from the added volume and compression of the superior sagittal sinus and venous system is also a major source of headache (Ramesh V., et al. 2014) (Klepinowski T., et al. 2020) In some cases, patients may experience lower limb neurological deficits, which may be unilateral or bilateral, due to direct compression of the motor cortex by the vertex EDH. Bilateral compression may result in paraparesis, mimicking spinal cord injury. (Messori A., et al. 2001)

In this case report, two different injury mechanisms occurred without any cervical involvement. According to a report by Hood, patients with significant head injuries have a higher risk of associated cervical injury compared to those without head injuries (4.5% vs. 1.1% based on Chi-square analysis). (Hood BR. 1994) However, we have not found any case reports similar to this one, indicating the need for further study.

Management of vertex EDH must consider the hematoma size, bleeding progression, location, and the patient's clinical presentation. (Ramesh V., et al. 2014) Smaller hematomas often resolve spontaneously. However, progressive hematomas may be fatal and require immediate surgical intervention. In our practice, we perform surgery in all symptomatic EDH cases, including vertex EDH. In this patient, we performed a craniotomy for evacuation. Some authors advocate for a midline craniotomy and opening of the superior sagittal sinus to control bleeding. Others prefer bilateral craniotomies separated by a bony bridge that protects the sinus and facilitates dural suspension. When bleeding is unilateral, a unilateral craniotomy may be performed, leaving a small amount of blood over the sinus and on the contralateral side. (Ben-Israel D., et al. 2017) (Miller DJ., et al. 1999) Throughout treatment, patients should be monitored clinically and radiologically to detect potential superior sagittal sinus thrombosis, which may result from hematoma-induced sinus compression. (Kumar J., et al. 2017)

We monitored the patient's intracranial pressure for one week. No signs of rebleeding, headache, projectile vomiting, or seizures were observed. The patient also showed motor and sensory improvement in the lower limbs. After one week, the patient underwent decompression and stabilization fusion surgery at L1 followed by rehabilitation.

CONCLUSION

Paraplegia can be caused by vertex EDH and L1 compression fracture. Accurate diagnosis, appropriate management, and close monitoring can result in a favorable outcome for the patient.

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