

Case Report

Atlas fracture after electroconvulsive therapy

Murtaza Rashid*; M.D. M.R.C.P. U.K., Majed Aljohani; M.D., Bandar Al Mufareh; M.D., Omar Alkharraz; M.D.

Department of Emergency Medicine, Royal Commission Hospital Jubail, Saudi Arabia

ORCID

Murtaza Rashid: <https://orcid.org/0000-0002-1976-4524>; Majed Aljohani: <https://orcid.org/0000-0001-9320-0076>; Bandar Al Mufareh: <https://orcid.org/0000-0002-4410-9054>; Omar Alkharraz: <https://orcid.org/0000-0002-1937-2854>

Background

Since the first-time electroconvulsive therapy was performed in 1938, it remains to this day as one of the most effective forms of treatment for patients with major depression and other psychiatric conditions. It works by a controlled electric current passed through the scalp and selected parts of the brain to induce a grand mal seizure. Due to its mechanism of action, the possibility of developing a physical trauma although rare, especially if done under an adequate modified form, is still possible.

Case

A young male presented to our Emergency Department after his routine electroconvulsive therapy with neck pain. Imaging of the neck showed fracture of the Atlas bone. Patient was treated conservatively.

Conclusion

Electroconvulsive therapy is one of the safe and common treatment modalities used for mental health issues around the world. However, injuries such as fractures have been reported following the procedure. As per our literature review, this is the first instance of Atlas fracture reported after electroconvulsive therapy worldwide.

Keywords: *Atlas, Spine, Fracture, Electroconvulsive therapy (ECT).*

Correspondence

Murtaza Rashid, M.D. M.R.C.P.
U.K. Department of Emergency
Medicine, Royal Commission
Hospital, Jubail, Saudi Arabia.

Email:
dr.murtazarashid@gmail.com
Tel: 013-346-4000

Article History

Received: 5 June 2022
Accepted: 5 September 2022
Published: 16 December 2022

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1. Introduction

Electroconvulsive therapy (ECT) along with pharmacotherapy and psychotherapy remains as one of the mainstays for treating depression and other psychiatric ailments (1, 2). The Food and Drug Administration (FDA) listed multiple risks associated with using ECT. One of the complications is physical trauma especially due to inadequate use of supportive drug treatment. Fractures though rare are important and potentially dangerous complications of ECT devices. In 2015, the FDA issued a proposed administrative order to reclassify the ECT device from class III into class II (special control); by doing so they recognized the overall safety of the device (3). A further study from department of health published in 2020 for the quantification of fracture rate confirmed the rarity of fractures due to ECT (4). Although rare, a patient with neck pain post ECT, one must keep a low threshold to rule out a fracture if no obvious reasons are found.

2. Case Presentation

A 40-year-old male known to have a chronic history of major depressive disorder presented to our emergency department with headache and neck pain extending to occipital region of the head. Pain increased with movement of the head. His symptoms started after he finished his regular dose of ECT two days ago. There was no weakness, loss of sensation, limb paresthesia or any change in level of consciousness. There was no vomiting, dizziness, or seizures. Patient denied any history of trauma; and he also denied history of a similar complaint to his previous sessions with ECT. Upon examination, he was vitally stable and oriented but looked unwell due to the pain. His Glasgow Coma Scale was 15/15. Both the pupils were equally reactive to the light and there was no nystagmus, no diplopia, no dysarthria, no limb weakness, and no ataxia. There

was midline cervical tenderness and limited neck movement. A plain X-ray of the neck was obtained which did not show any fracture. CT scan of the brain did not show any hemorrhage or any signs of ischemic stroke. However, CT cervical spine showed a displaced fracture through right transverse process of C1 involving the foramen transversum (Figures 1 & 2). An urgent cervical spine MRI was done for further assessment, and it showed right vertebral artery was diffusely and homogeneously smaller in caliber, but no pseudo aneurysm formation or occlusion was seen at the level of the fracture line. Notably, there was no associated ligamentous disruption, parenchymal hemorrhage, contusion, edema, or compression of the cord (Figure 3). CT angiography was done to assess the blood vessel integrity which confirmed the right non-dominant vertebral artery with reduced diameter uniformly throughout its whole course in neck and intracranially (Figure 4 & Video). The patient was treated with analgesia and was put on a hard cervical collar. Patient was admitted under neurosurgical services and was closely observed for any neurological deficits. Patient stayed in hospital for three days and showed good improvement in pain. A neck collar was applied and he was treated with analgesics. He did not exhibit any unwanted signs and symptoms and his inpatient stay was uneventful. He was followed regularly in outpatient setting and after six months now is completely free of any symptoms. A recent cervical CT scan showed a stable fracture and patient commenced his remaining ECT sessions without any symptoms.

3. Discussion

Fractures are a very rare complication of ECT and corresponds to a rate of about 3.56 per one million treatments (4). These rates are very less as compared to morbidity from commonly accepted medical interventions like endoscopic procedures. These fractures range from tooth, spine, to long bones

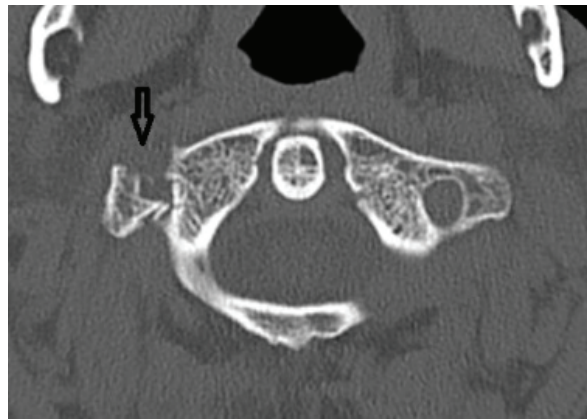


Figure 1. CT scan transverse section of cervical spine showing fracture of right transverse foramen of Atlas.

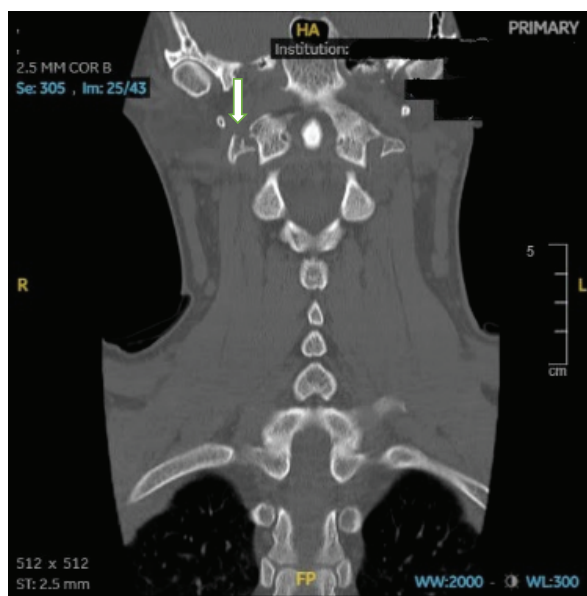


Figure 2. CT scan coronal section of cervical spine showing fracture of right transverse foramen of Atlas.



Figure 3. MRI cervical T2 weighted sagittal section showing no hemorrhage, edema, or compression of the cord.

(5–8). Acetabular fracture-dislocations which usually occur because of high-velocity trauma have also been

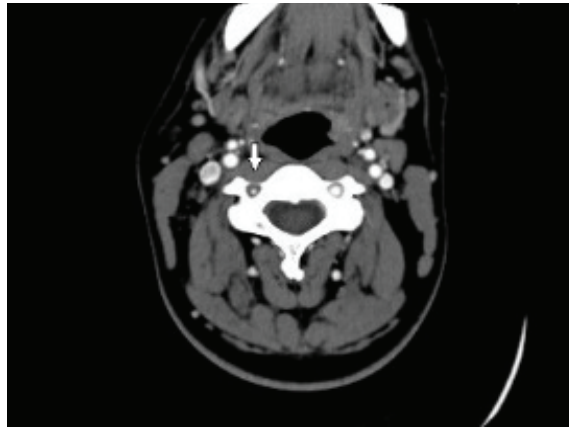


Figure 4. CT angiogram showing right non-dominant vertebral artery.

reported following ECT (6). We have found cases of bilateral femoral neck fractures after ECT in the literature (9). Expert opinions have recommended using modified ECT to eliminate these complications. Atlas fractures account for 1–2% of all spine injuries and up to 13% of cervical spine fractures (9, 10). Most of the C1 fractures are caused by motor vehicle accidents (80–85%), falls, and diving into shallow waters (11). Nonoperative management remains the mainstay of stable and isolated C1 fractures (10). A rigid collar, halo vest, or a Minerva jacked is used depending on case and the preference. In patients with atlanto-occipital and atlanto-axial disruption, unstable fractures or severe ligamentous injury, surgical intervention should be considered (10). Left vertebral artery is known to be dominant in about 70% of individuals as was in our patient (12). Although ECT is usually considered a safe practice, the aforementioned cases draw our attention to the fact that it can potentially cause a debilitating fracture which if missed can be catastrophic.

4. Conclusion

Patients should be fully evaluated and examined after each ECT for neck as well and necessary imaging must be initiated if any suspicion of fracture arises. Emergency physicians should keep incidence

of fractures in their differentials if patient comes with pain post ECT.

To the best of our knowledge, this is the first case of Atlas (C1) fracture after ECT in the medical literature and we should keep this as a differential in neck pain post ECT.

Acknowledgements

None.

Conflict of Interest

None.

Authors' Contribution

All the authors contributed equally in literature search, writing, editing, and appraisal.

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