

Usefulness of Magnetic Resonance Imaging for Diagnosing Os Odontoideum

Soichiro Ota, Ken-ichi Muramatsu, Ikuto Takeuchi, Youichi Yanagawa*

Department of Acute Critical Care Medicine, Shizuoka Hospital, Juntendo University

*Corresponding author: yyanaga@juntendo.ac.jp

Received January 05, 2023; Revised February 13, 2023; Accepted February 23, 2023

Abstract A 75-year-old woman fell down after tripping over a step and suffered blunt face, neck and left shoulder injuries. On arrival, she had clear consciousness, tachycardia, tachypnea, posterior neck tenderness, left shoulder motion pain without motor or sensory disturbance at each extremity, and contused wounds at the forehead, nasion, upper lip, and left leg. Computed tomography (CT) showed congenital fusion of C3 and C4 (Klippel Feil syndrome) and separation of the dens body, which was initially diagnosed as acute dens fracture. Subsequent magnetic resonance imaging (MRI) showed dens body bruising and soft tissue injuries around the cervical spine. However, there was no sign of injury at the junction of the separated dens. She received a diagnosis of congenital os odontoideum without instability. She was treated with only a soft collar and pain killers and discharged on foot on day 10. To manage a patient with os odontoideum and blunt neck trauma, MRI is necessary to make a correct diagnosis, identify associated injuries and provide appropriate treatment.

Keywords: *os odontoideum, Klippel Feil syndrome, magnetic resonance image*

Cite This Article: Soichiro Ota, Ken-ichi Muramatsu, Ikuto Takeuchi, and Youichi Yanagawa, "Usefulness of Magnetic Resonance Imaging for Diagnosing Os Odontoideum." *American Journal of Medical Case Reports*, vol. 11, no. 2 (2023): 41-42. doi: 10.12691/ajmcr-11-2-9.

1. Introduction

The odontoid process (dens) is derived from the fourth occipital sclerotome and the first and second cervical sclerotomes. [1-4] A failed fusion of this stage can produce congenital ossiculum terminale (separation of the tip of the dens) or os odontoideum (separation of the body of the dens), defined radiologically as an oval or round-shaped ossicle with smooth circumferential cortical margins. One of the main risks of this anatomical entity is the association of anterior (or rare posterior) atlantoaxial subluxation. This condition can be asymptomatic, but in some cases, it can produce severe cervical instability requiring operation.⁴ This anomaly must be promptly diagnosed to decrease the risk of spinal cord compression. Differential diagnoses that can produce this instability, such as acute dens fracture, should be ruled out.

We herein report the usefulness of magnetic resonance imaging (MRI) to diagnose os odontoideum in a patient with blunt neck trauma.

2. Case Report

A 75-year-old woman fell down after tripping over a step and suffered blunt face, neck and left shoulder

injuries. She was transported to our hospital by an ambulance. She had hypertension, chronic heart failure, bilateral artificial hip prostheses and a history of lumbar spinal operation for spinal canal stenosis and artificial heart valve replacement requiring antihypertensive drugs, anticoagulants and a dehydrator. Her vital signs on arrival were as follows: Glasgow Coma Scale, E4V5M6; blood pressure, 133/95 mmHg; heart rate, 143 irregular beats per minute; respiratory rate, 28 breaths per minute and percutaneous saturation, 97% under room air. She had contused wounds at forehead, nasion, upper lip and left leg, as well as posterior neck tenderness and left shoulder motion pain. She had no paresis or dysesthesia. Traumatic pan scan showed congenital fusion of C3 and C4 (Klippel Feil syndrome) and separation of the dens body, which was initially diagnosed as acute dens fracture (Figure 1). The main results of a biochemical analysis of her blood were drug-induced coagulopathy and liver dysfunction.

Emergency MRI showed dens body contusion and soft tissue injuries around the cervical spine. However, there was no sign of injury at the junction of the separated dens (Figure 2). As she also had Klippel Feil syndrome, the presence of separated dens was diagnosed as congenital os odontoideum without instability. [1,5] She received only a soft collar and pain killers as treatment. After rehabilitation, she was discharged on foot on day 10.

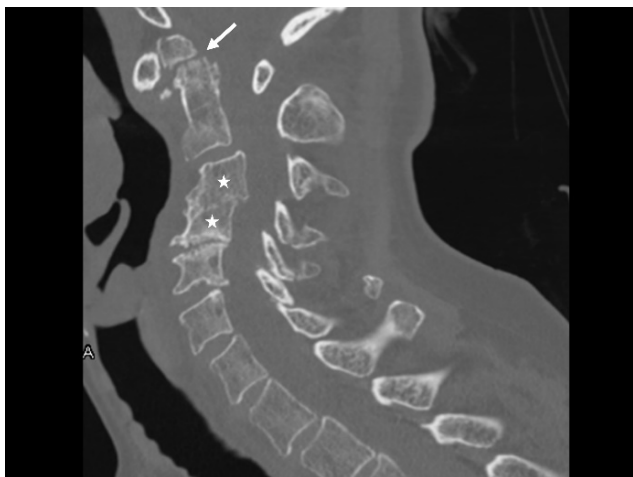


Figure 1. Multiple reconstruction images of neck computed tomography (CT) on arrival (CT showed congenital fusion of C3 and C4 (star, Klippel Feil syndrome) and separation of the dens body (arrow), which was initially diagnosed as acute dens fracture)

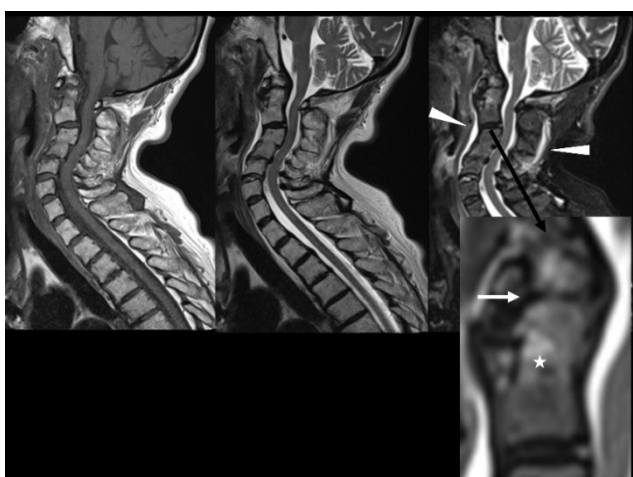


Figure 2. Emergency magnetic resonance imaging (MRI) on arrival. MRI showed a dens body bruise (star, insufficient fracture) and soft tissue injuries around the cervical spine (triangles). There was no sign of injury at the junction of the separated dens (white arrow) and spinal cord. Left, T1-weighted image; middle, T2-weighted image; right, short TI inversion recovery image

3. Discussion

The present case demonstrated the usefulness of MRI for diagnosing os odontoideum in a patient with blunt neck trauma. To our knowledge, there have been no reports emphasizing the importance of MRI for diagnosing os odontoideum correctly in the acute phase of blunt neck trauma.

A major differential diagnosis of os odontoideum is acute dens fracture, which would show a thin, irregular space instead of the wide and smooth space of os odontoideum on plain lateral cervical radiographs and computed tomography (CT) with sagittal reconstruction or MRI. Concerning the diagnostic reliability among

conventional radiography, CT and MRI, a previous study clearly showed the superiority of CT and MRI to conventional radiography in the diagnosis of bony and ligamentous disorders in acute sprains of the foot. [6] In addition, MRI is more useful than CT for not only differentiating between os odontoideum and fracture but also identifying associated insufficient fracture, soft tissue injuries and/or spinal cord injuries. [7,8] The treatment plan in the present case was changed from surgical fusion (based on CT findings) to stabilization using a neck collar (based on subsequent MRI findings).

Accordingly, to manage a patient with os odontoideum and blunt neck trauma, MRI is necessary to diagnose the case correctly, identify associated injuries and provide appropriate treatment.

4. Conclusion

To manage a patient with os odontoideum and blunt neck trauma, MRI is necessary to make a correct diagnosis, identify associated injuries and provide appropriate treatment.

Acknowledgements

This work was supported in part by a Grant-in-Aid for Special Research in Subsidies for ordinary expenses of private schools from The Promotion and Mutual Aid Corporation for Private Schools of Japan.

References

- [1] Duarte MP, Das JM, Willhuber GOC. Os Odontoideum. 2022. Aug 22. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. PMID: 31194437
- [2] Cho S, Shlobin NA, Dahdaleh NS. Os odontoideum: A comprehensive review. *J Craniovertebr Junction Spine.* 2022 Jul-Sep; 13(3): 256-264.
- [3] Klimo Jr P, Kan P, Rao G, Apfelbaum R, Brockmeyer D. Os odontoideum: presentation, diagnosis, and treatment in a series of 78 patients. *J Neurosurg Spine.* 2008 Oct; 9(4): 332-42.
- [4] Wang Q, Dong S, Wang F. Os odontoideum: diagnosis and role of imaging. *Surg Radiol Anat.* 2020 Feb; 42(2): 155-160.
- [5] Akhtar MS, Rehman RU, Ali I. Surgical Management Of Irreducible Atlanto-Axial Dislocation With OS Odontoideum And Klippel-Feil Syndrome. *J Ayub Med Coll Abbottabad.* 2022 Jul-Sep; 34(3): 573-577.
- [6] Peicha G, Preidler KW, Lajtai G, Seibert FJ, Grechenig W. Diagnostic value of conventional roentgen image, computerized and magnetic resonance tomography in acute sprains of the foot. A prospective clinical study. *Unfallchirurg.* 2001 Dec; 104(12): 1134-9. In German.
- [7] Tavolario C, Ghaffar S, Zhou H, Nguyen QT, Bellabarba C, Bransford RJ. Is routine MRI of the spine necessary in trauma patients with ankylosing spinal disorders or is a CT scan sufficient? *Spine J.* 2019 Aug; 19(8): 1331-1339.
- [8] Graul I, Vogt S, Strube P, Hölzl A. Significance of Lumbar MRI in Diagnosis of Sacral Insufficiency Fracture. *Global Spine J.* 2021 Oct; 11(8): 1197-1201.

