



Case Report

# Rod migration through foramen magnum into posterior fossa after cervical spine lateral mass fixation: A case report and literature review

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## ABSTRACT

**Background:** Posterior cervical fusion is one of the most common surgical procedures performed for the treatment of many cervical spine pathologies. Hardware failure, due to rod displacement either cranially or caudally, may occur.

**Case Description:** Two years following a subaxial laminectomy/lateral mass fusion (from C3 to C6) for stenosis, a 67-year-old female, with a history of trauma 2 months ago, presented with headaches, right-sided facial palsy, and right complete ophthalmoplegia. When the computed tomography scan showed migration of the left-sided rod extending into the posterior fossa through the foramen magnum plus malpositioning of the right rod, she underwent bilateral rod removal resulting in marked headache improvement without improvement of ophthalmoplegia and facial palsy.

**Conclusion:** Cephalad rod migration/displacement extending through the foramen magnum into the posterior fossa is a rare complication of cervical laminectomy/rod lateral mass screw instrumented fusion.

**Keywords:** Cervical, Lateral mass, Migration, Posterior fossa, Rod

## INTRODUCTION

The several methods for cervical decompression/fusion include the application of wires, lateral mass screws, pedicle screws, and transarticular screws.<sup>[4]</sup> Posterior cervical lateral mass screw/rods may result in lateral mass fracture, nerve root injury and vertebral artery injury, or hardware migration breakage or displacement.<sup>[2]</sup> Here, we present a 67-year-old female who, 2 years following a subaxial cervical decompression/lateral mass screw/rod fusion (from C3 to C6) for stenosis, developed cephalad migration of a left-sided rod into the posterior fossa through foramen magnum along with malpositioning of the right-sided rod.

## CASE REPORT

A 67-year-old female originally underwent a cervical laminectomy with lateral mass fixation (from C3 to C6) for cervical canal stenosis [Figures 1 and 2]. After two postoperative visits that included plain X-rays, the patient was lost in follow-up. However, 2 years postoperatively and

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**Figure 1:** Cervical spine magnetic resonance imaging showing cervical canal stenosis.



**Figure 2:** Postoperative X-ray of cervical spine lateral view showing lateral mass fixation.

2 months following a traumatic event, she newly presented with headache, right-sided facial palsy, and right complete ophthalmoplegia. The computed tomography (CT) scan of the brain and cervical spine showed migration of the left-sided connecting rod into the posterior fossa through the foramen magnum with accompanying malpositioning of the right-sided rod [Figure 3]. The CTA (CT cerebral angiography) excluded encroachment on the posterior circulation. She underwent more cephalad C1 and C2 laminectomy with bilateral rod removal. Once the foramen magnum was decompressed, and after opening the dura and arachnoid, the left-sided rod was visible having extended into the subarachnoid space. It was removed along with the right-sided rod that had become embedded in the paraspinal muscles. Postoperatively, headache improved but ophthalmoplegia and facial palsy did not improve.

**Table 1:** Case summary.

Age	67 years
Initial procedure	Laminectomy and lateral mass fixation
Time to migration/displacement	2 years
Possible cause	Trauma
Condition after migration/displacement	Headache, ophthalmoplegia, and facial palsy
Condition after surgical correction	Headache only improved

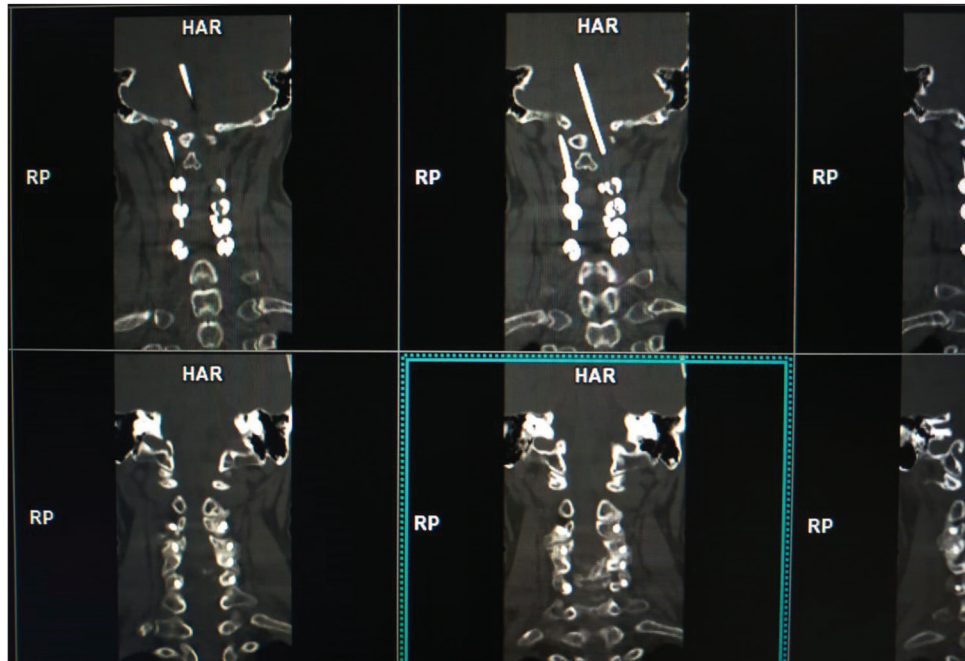
## DISCUSSION

### Risks of cephal malpositioning/displacement of posterior cervical rods

Lateral mass screw fixation with rods or plates has become one of the most popular methods for posterior cervical spine fixation.<sup>[8]</sup> There is a reported 2–5% risk for cephalad malpositioning/displacement of posterior cervical rods.<sup>[3]</sup> Here, we presented a 67-year-old female who developed cephalad migration of a left-sided rod that extended into the posterior fossa subarachnoid space through the foramen magnum along with the right-sided rod malpositioning (i.e., into the cephalad paraspinal muscles) 2 years following a posterior cervical lateral mass fusion for stenosis [Table 1].

### Literature on cephalad migration/displacement of lateral mass screw/rods

Other studies have similarly reported cephalad displacement of posterior cervical rods to/through the foramen magnum into the posterior fossa resulting in brainstem compression [Table 2]. In Kiran *et al.*, the patient with ossification of the posterior longitudinal ligament and cephalad rod migration through the foramen magnum caused cerebellar damage resulting in death.<sup>[5]</sup> Plant and Ruff, following a C1-C2 instrumented fusion for os odontoideum, reported cephalad rod migration into the suboccipital skull.<sup>[7]</sup> Yablon *et al.* discussed cephalad rod migration into the cerebellum 4 years after a C4-C5 fusion utilizing Harrington rod instrumentation.<sup>[9]</sup> Chun *et al.* additionally observed rod migration into the posterior fossa 20 months after C1-C2 Harm's fixation for an odontoid fracture.<sup>[1]</sup> Fifteen years after C1-C2 fusion, Mahtabfar *et al.* further reported rod migration with a subsequent cerebellar hemorrhage 70-year-old patient with rheumatoid arthritis.<sup>[6]</sup> Notably, patients with rheumatoid arthritis are at high risk for failed posterior cervical instrumented rod fusions and for cephalad rod migration with marked neurological sequelae.



**Figure 3:** Computed tomography scan of cervical spine and skull coronal cut showing migration of the left-sided connecting rod into the right posterior cranial fossa through the foramen magnum and malposition of the right-sided rod.

**Table 2:** Studies' summary from the literature.

Author	Kiran <i>et al.</i>	Plant and Ruff	Yablon <i>et al.</i>	Chun <i>et al.</i>	Mahtabfar <i>et al.</i>
Age	55 years	13 years	18 years	23 years	70 years
Initial procedure	Laminectomy and lateral mass fixation	C1/C2 fixation	C4/5 Harrington rod hook fixation	C1/C2 fixation	C1/C2 fixation
Time to migration/displacement	1.5 years	3 years	4 years	20 months	15 years
Possible cause	-----	Trauma	-----	-----	Rheumatoid arthritis
Condition after migration/displacement	Loss of consciousness and quadriplegia	Neck pain	Neck pain and dizziness	Occipital headache and dizziness	Headache, dizziness, nausea, and vomiting
Condition after surgical correction	Death	Improved	Improved	Refused operation	Stationary course

## CONCLUSION

Rod migration or displacement is a rare complication of cervical lateral mass screw/rod fixation procedures. For patients developing symptoms/signs of brainstem compression, appropriate diagnostic studies (i.e., CT/MR and CTA of the brain/cervical spine) should be performed and lead to prompt surgical remediation (i.e., decompression/instrumentation removal as needed).

## Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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