

Intradural migration of cervical posterior fixation rods

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Abstract

Background Instrumented spinal fixations are an important tool in the management of traumatic conditions and delayed complications are rare.

Case report We present a case of open reduction and fixation of traumatic C5/6 facet fracture dislocation with late complication in the form of intradural hardware migration.

Conclusion To our knowledge, this is the first report of an intradural rod migration distant to the initial surgery in a patient without posterior decompression. This highlights the need for long-term follow-up of patients with spinal instrumentation.

Keywords Spinal fixation · Rod fixation · Rod migration · Hardware failure

Background

Instrumented spinal fixations are an important tool in the management of traumatic conditions and delayed complications are rare. There are no firm guidelines regarding the length of follow-up necessary after these fixations and most clinicians have devised their own schedule. The instruments used often differ quite considerably between manufacturers in the mechanisms of locking the caps and rods. It is vital that surgeons and theater staff are comfortable with the use of the equipment.

Case report

A 29-year-old man presented to the Accident and Emergency Department after having been involved in a rugby tackle during which he sustained a bilateral C5/6 facet fracture dislocation (Fig. 1). On presentation, there was no neurological deficit. He underwent anterior cervical discectomy, open reduction and fixation with an interbody cage and plate. In addition, he also had a posterior fixation of C5 and C6 with lateral mass screws, but no decompression and the posterior elements were not disturbed. Post-operatively, there were no complications and the patient made an excellent recovery. Although he did not return to playing rugby, he pursued several other sporting activities as before his injury and returned to full time work as an account manager.

The patient was seen in the follow-up clinic 3 months after his operation. At this stage, X-rays of the cervical spine were obtained and implant position and spinal alignment were deemed satisfactory (Fig. 2). The patient then moved out of area and was, therefore, not followed up further at our institution.

Four years later, the patient re-presented to the outpatient clinic with lower back pain. Investigations failed to reveal a surgical cause for this pain, but during the consultation, the patient mentioned that 2 months prior to this clinic appointment, he had an episode of sudden onset severe occipital headache and neck pain without any trauma or precipitating factors. He did not seek medical advice at the time of this headache and over the following month it resolved. There was no neurological deficit. The following investigations were arranged: MRI and CT scan of the cervical spine and flexion/extension cervical spine X-rays. These showed that the rods of the posterior instrumentation had become loose and migrated cranially.

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Fig. 1 MRI scan of cervical spine, sagittal view showing the C5/6 facet fracture dislocation

One rod was now situated in the vicinity of the Foramen magnum, the second rod in the musculature of the left lateral neck at the levels of C2–C4 with the tip embedded in the lamina of C2 (Figs. 3, 4, 5, 6). The MRI scan confirmed that one rod was in an intradural position (Fig. 7). However, the fixation at C5/6 looked solid with bony consolidation around the disc and cage.

The patient was taken to theater the following day for removal of the dislodged rods. Through a midline incision cranial to the previous approach, the bony spine was exposed from C1 to C4. The right-sided rod was found in the paraspinal muscles around C2 and C3 and partially embedded into the C2 lamina; this rod was removed. The left-sided rod was visible though a partially healed dural defect between the C1 and C2 laminae, although no active CSF leak was observed (Fig. 8). A C1 laminectomy and widening of the foramen magnum were performed. The dura was opened over C1 and the rod was visible through the arachnoid layer. The arachnoid membrane was opened (Fig. 9) and the rod removed without complications. The dura was repaired and closed. The patient made an uneventful recovery remaining neurologically intact. He was reviewed in the outpatient clinic 10 days post-OP. Flexion–extension X-rays of the cervical spine obtained 3 months post-OP were entirely satisfactory as were the X-rays on his 2-year follow-up visit (Fig. 10).

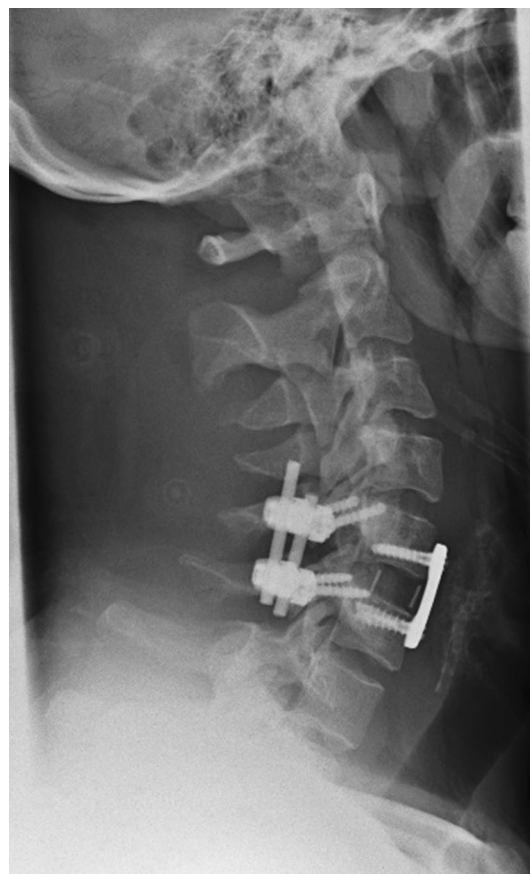


Fig. 2 Post-operative cervical X-ray at 3 months

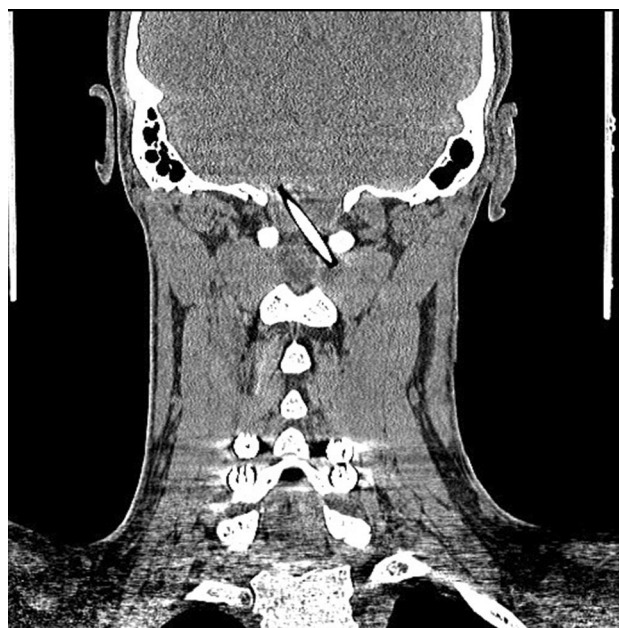


Fig. 3 CT cervical spine (coronal view). Position of the dislodged rod near the Foramen magnum

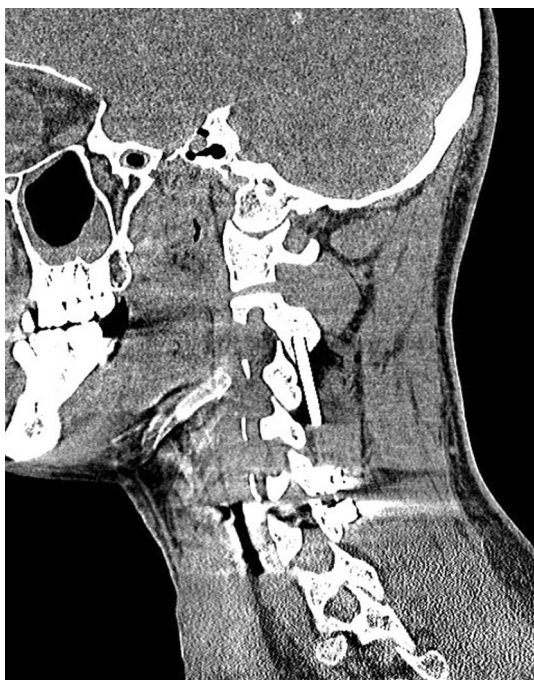


Fig. 4 CT cervical spine (sagittal view). Position of the dislodged rod in the neck

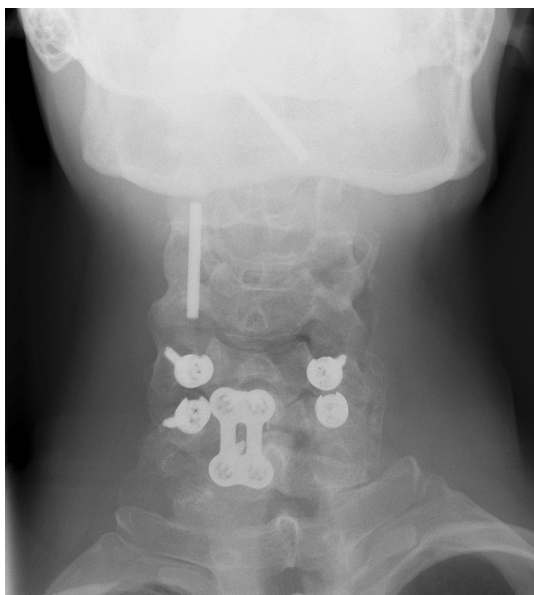


Fig. 5 X-ray cervical spine (ap view). Position of the dislodged rods in the neck and near the Foramen magnum

Discussion

Instrumented fusion is an important tool to treat unstable traumatic spinal injuries. Although there are guidelines [1] detailing the indications for these instrumented fusions, there is so far no consensus how to follow these patients up.



Fig. 6 X-ray cervical spine (lateral view). Position of the dislodged rods in the neck and near the Foramen magnum

Most clinicians have devised their own schedule according to the individual case and the specific fixation system used. In our institution we routinely follow patients with traumatic cervical spinal injuries who have been fused with 360 degree fixation for 1 year with a combination of X-rays and CT scans.

During the primary procedure of the patient discussed in this report there were no complications or untoward incidences. The surgeon was an experienced spine surgeon used to spinal instrumentation and torque devices for tightening of the caps and felt that satisfactory position and fixation of the metal work had been achieved. Clinically the patient made a very good recovery and returned to previous, normal levels of activity. He denied having experienced any neck problems during the following 4 years. Due to the patient moving house he was last seen in the clinic 3 months post-OP with flexion/extension cervical spine X-rays.

There have been sporadic reports of intradural migration of metal fixation devices in the literature, especially of wires [2, 3]. Chalouhi et al. [4] also reported migration of a spinal fixation rod and screw from an occipito-cervical fusion. However, so far intradural migration of spinal fixation rods from C5/6 into the foramen magnum has not been reported, in particular as no posterior decompression was undertaken. The rods migrated from the C5/6 level along the laminae and one rod pierced the dura between C1/2. Despite migration of the entire rod, the spinal cord was thankfully not injured.



Fig. 7 MRI scan (sagittal view). Intradural position of the dislodged rod (A) at the Foramen magnum

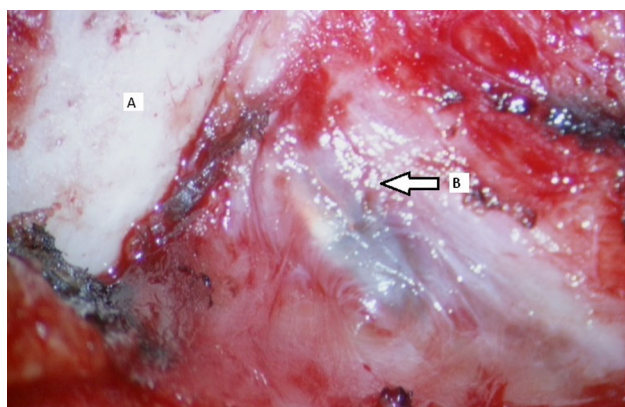


Fig. 8 Intraoperative picture. A C1 arch, B rod the rod visible through the healed dural defect

In Chalouhi's case, it was not proven that the cerebellar hemorrhage the patient presented with was caused by the migration of the spinal rods and as a consequence it was assumed that the migration was chronic hardware failure

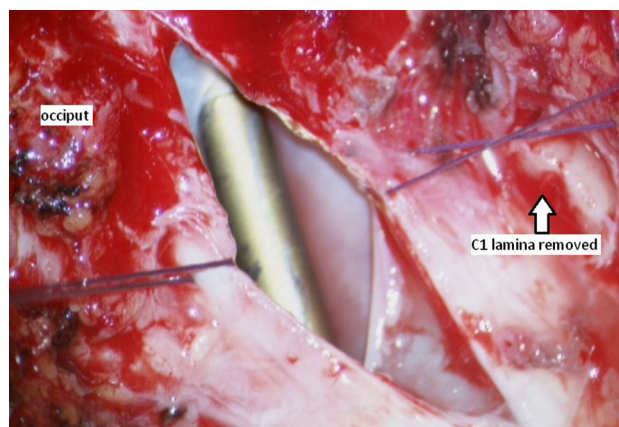


Fig. 9 Intra-operative picture. Rod positioned inside the thecal sac after opening of the meninges



Fig. 10 Two-year follow-up X-ray (in flexion) showing the C5/6 anterior cervical discectomy and fusion with anterior plate and the lateral mass screw fixation

and it was, therefore, not retrieved. In our case, there was no neurological dysfunction, but as the rod was lying next to the upper spinal cord touching the cerebellum it required removal.

We believe that the reason for failure of this fusion could lie in failure of the torque screw driver or, indeed, the tightening technique. In older fixation systems, the surgeon had to tighten the caps onto the rods and screws by hand, judging the tightness by the force applied. In current

fixation systems a torque screw driver is employed which shows external markers to guide the surgeon as to the tightness achieved. There is, however, no way for the surgeon to check whether the torque applied corresponds the torque the markers indicate and it is well possible that the mechanism fails gradually over time. We would, therefore, recommend that companies regularly check the accuracy of the torque mechanism.

It is our suspicion that the rods migrated slowly over the years and that if the patient had been followed up for longer than 3 months in our outpatient clinic, X-rays would have shown beginning movement of the implants. As the patient's move out of area, the follow-up may have been insufficient to show early indications of rod migration.

It is self-evident that the surgeon and theater team should be completely at ease with the use of the spinal fixation system chosen. Furthermore, our case illustrates the requirement to follow the patients up adequately and to investigate onset of new symptoms to detect delayed instrumentation related complications. There may be a need for guidelines as to what form this follow-up should take (clinical assessment versus serial X-rays or CT scans) and how long it should be continued for as there often is a drive in modern health care systems to economize and

shorten follow-up periods. Furthermore, patients are nowadays more aware of advantages and disadvantages of specific investigation and may have preferences that should be taken into consideration.

Conflict of interest The authors declare they have no conflicts of interest and no funding was secured in the preparation of this manuscript.

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