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### Removal of poly-axial pedicular screw with fractured screw driver slot

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#### Abstract

The use of pedicular screws for spinal surgery has revolutionised the field. The use of poly-axial pedicle screws has eased the difficulties of assembling the rod and screw construct by providing a degree of freedom to the coupling component. This is also associated with increased difficulty in removal of implants, due to the mobile nature of the poly-axial tulip component. We describe a case of a 48 year old patient who had undergone discectomy and posterolateral instrumented fusion of the lumbar spine for L4L5 prolapse of intervertebral disc 3 years ago. She presented with L5 radiculopathy due to malpositioned pedicular screw in the L4 vertebra and was taken for exploration and implant removal. Intra-operatively the L4 pedicular screw was found to have a fractured screwdriver slot. It was removed by dismantling the poly-axial tulip to expose the threaded shaft, which was subsequently removed with the help of a plier.

**Keywords:** Removal, poly-axial Pedicular, screw driver slot

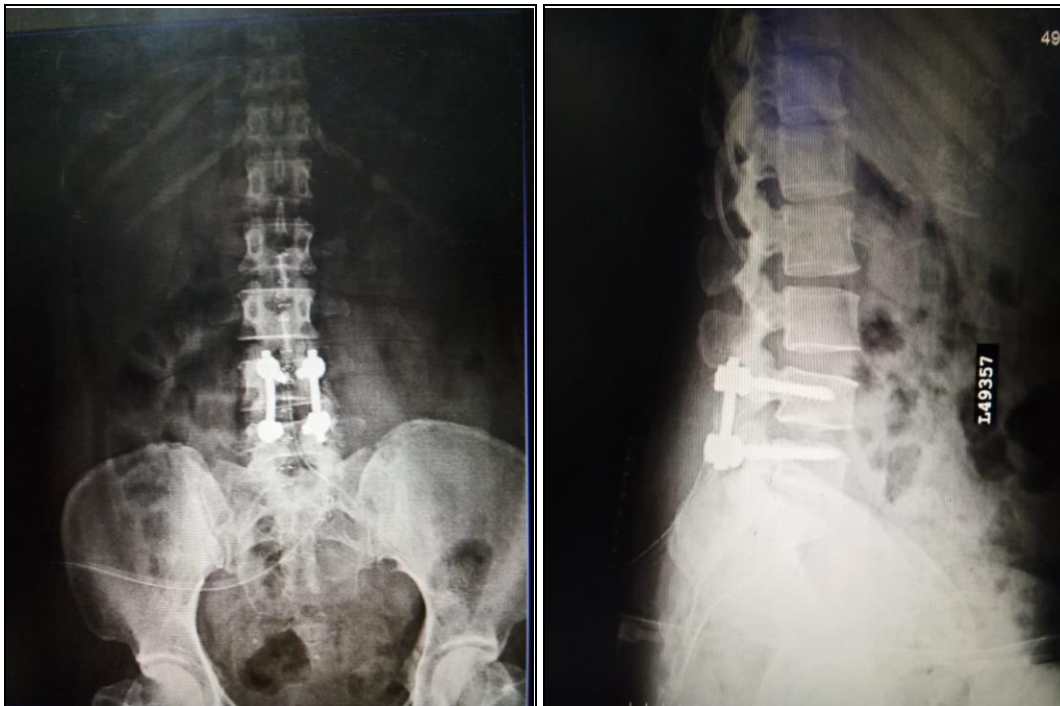
#### Introduction

The use of pedicular screws for spinal surgery has revolutionised the field. Pedicular screws provide biomechanical stability to the vertebral segment with a small area of instrumentation, even in the absence of posterior vertebral elements, and improve the outcomes of spinal fusion [1, 2].

Poly-axial pedicle screws have eased the difficulties of assembling the rod and screw construct by providing a degree of freedom to the coupling component [3]. This degree of freedom may obstruct removal of the screw if the head of the screw with the slot for the screwdriver is damaged.

#### Case report

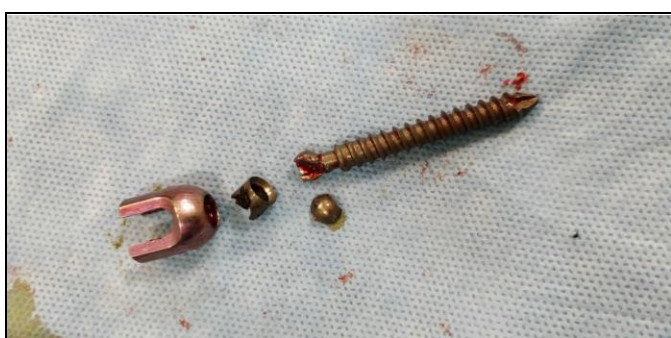
A 48 year old patient had under gone discectomy and posterolateral instrumented fusion of the lumbar spine for L4L5 prolapse of intervertebral disc in 2016. She presented in 2019 with right lower limb radiculopathy, foot drop and reduced sensation in the first web space of the right foot, suggestive of L5 nerve root lesion. On radiography, malposition of the right sided pedicular screws was noted in the 4<sup>th</sup> and 5<sup>th</sup> lumbar vertebrae on the right side. Subsequent MRI showed impingement of the spinal canal by the pedicular screws on the right side. Patient was taken for implant removal. The lumbar spine was exposed using a midline incision and subperiosteal reflection of the paraspinal muscles to expose the pedicular screw heads. Top screws were removed with the corresponding screw driver. The connecting rods were removed. Both left sided screws and right L5 screws were removed with the corresponding locking polyaxial screwdriver. In the right L4 screw, the screwdriver and the polyaxial head component were found to be rotating in place as the screwdriver was unable to engage the slot in the screw head. The head of the screw was found to be split, preventing the screwdriver head from engaging its slot on the screw. We proceeded to dismantle the polyaxial tulip assembly by dislodging the inner ring coupling the polyaxial component and the screw, over the broken screw head using a 5mm curved Osteotome inserted between the inner ring and broken screw head. The fragment of the screw head was removed. The polyaxial head was then removed with a plier to expose the broken screw head. The head was grasped with a plier and the screw rotated counter-clockwise to remove the screw from the pedicle without damaging it.



**Fig 1:** Radiograph (AP and Lateral) of Lumbosacral spine



**Fig 2:** MRI axial cuts of lumbosacral spine showing spinal canal impingement



**Fig 3:** Broken pedicular screw with its dismantled polyaxial components

**Discussion**

Pedicle screw breakage is reported to occur in 1-11.2% of inserted screws and in 0.4-24.5% of patients (4). Polyaxial screws commonly fail at the head to screw coupling, with is the weakest point of the construct (5). Fracture of the screw head with intact coupling has not been commonly described. Multiple methods have been described for removal of the retained screw. These methods range from the use of metal cutting burrs to create a new slot in the remaining screw [6],

reshaping the remaining screw to form a new triangular head [7], use of specially designed screw drivers [8], using a drill-bit placed in the pedicle at the screw bone interface [9]. All these methods are effective for removal of the retained screw shaft once the head and coupled polyaxial tulip unit have been removed.

In our case, the fractured head prevented the screwdriver for engaging the head, allowing the screwdriver, coupled to the polyaxial tulip the rotate freely but the screw remained anchored in the bone as the tip of the screwdriver failed to engage in its slot. Dismantling the screw components allowed for removal of the screw without damaging the pedicle.

**Conclusion**

Poly-axial pedicular screw with a damaged screwdriver slot may be safely removed without damaging the pedicle by disassembling the components of the screw, without requiring any specialized instruments.

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