

Unique Procedure to Remove Pedicle Screw without Compatible Instrumentation: Case Report and Review of Literature

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Learning Point of the Article:

Thus, our screw removal technique can help in implant removal in revision spine surgeries in peripheral centers or small cities where there are limited facilities in terms of instrumentation and availability of implants.

Abstract

Introduction: As the number of patients undergoing spine fixation has increased, the requirement for revision surgery has also increased. Difficulty faced while doing revision surgery is mostly in removing polyaxial pedicle screws, especially if we do not have the desired instrumentation.

Case Report: A 55-year-old patient previously operated for D12 fracture presented to us with implant failure due to backing out of pedicle screws. Compatible instrumentation to remove the implant was not available as even the cap screw could not be removed due to screwdriver mismatch. Hence, we had to design our own method to address the problem which we did successfully. At present, the patient is on our regular follow-up, is pain free, is able to walk without support, and has not reported any new complaints.

Conclusion: Method used in our case simplifies and accelerates the screw removal process and provides guidance to any surgeon who faces a similar problem.

Keywords: Implant failure, jumbo cutter, pedicle screw.

Introduction

Nowadays, more people are opting for spine surgery rather than bearing pain and taking medications. In the 1930s, the implant material was not that good due to which a large number of cases ended in implant failure [1]. After the 1940s, the implant material and implant techniques have gone through considerable changes due to which they can resist the continuous stress of weight-bearing, flexion, and extension until fusion occurs. The most common reason for implant failure is unsuccessful fusion [2]. There is a race between implant failure and union and if union does not occur, there are high chance that patient will land up in implant failure which can be in the form of hardware

fracture, loosening of screws, and screw pullout [3]. Hardware loosening can be caused by osseous resorption surrounding screws and implants. Loosening in turn allows for movement which causes further osseous resorption, increased mobility, and eventually screw pullout or vertebral fracture [4, 5].

Diameter of cap screw head varies from one implant to another due to the lack of standardization of implants, especially in developing countries like India. Therefore, it is necessary to have the same instrumentation which was used in the previous surgery. This is not always possible as most of the time information about previous implant is not known and sometimes even if it is known may still not be available due to

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Author's Photo Gallery



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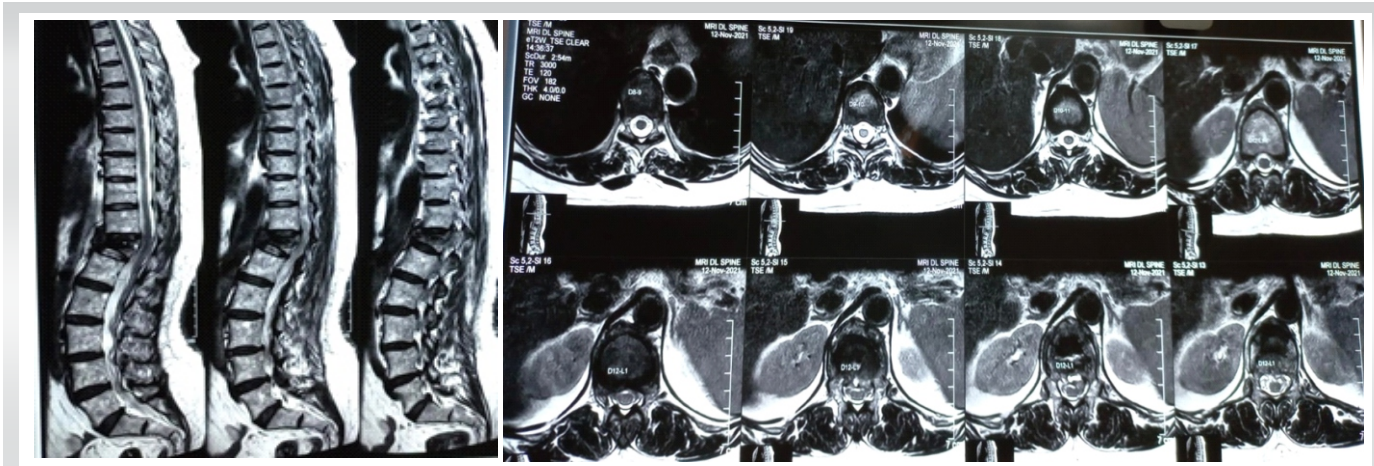


Figure 1: MRI Image before the first surgery showing D12 fracture.

various reasons, like company no more working, or patient undergoing revision surgery in a city where that implant may not be available. Revision surgery always takes more time which in turn also leads to the risk of increased blood loss as well as infection. Innovative method used in our case simplifies and accelerates the polyaxial screw removal process; thus, shortening the operating time.

Case Report

A 55-year-old female came to us on wheelchair with back pain radiating to bilateral lower limbs for 6 months and being able to walk few steps inside house only to attend her basic daily toilet routine. The patient was operated elsewhere for D12 fracture 6 months back in which pedicle screw fixation was done, 2 each in D11 and L1 vertebra. The patient only had pre-operative MRI

(Fig. 1) when she came to us in OPD.

According to the patient, pain persisted even after the surgery. On examination, there was no sensory or motor deficit in lower limbs. In X-ray, it was seen that one pedicle screw in D11 vertebra had backed out and there was localized kyphosis at D12 vertebra (Fig. 2).

The patient was planned for surgery. Instrumentation was not known. Hence, we had kept all possible instrumentation including Allen key. Removal of pedicle screw requires the removal of cap screw first followed by rod and pedicle screw. In our case, cap screw was of 4.5-mm size, however, size of screwdriver available was of 6.5 mm. We also tried locking screw driver which did not work. We then tried different 4.5-mm screwdrivers, but they were also not compatible with the cap screw head. Hence, we used jumbo cutter as a final modality to

cut the rods close to the head of the screws (Fig. 3) due to which polyaxial screw along with small piece of rods on their head behaved like a single unit. These rods acted as levers with which pedicle screws were removed (Fig. 4). Following implant removal, 6.5-mm screws 2 each were inserted in D10, D11, L1, and L2 vertebra while a single pedicle screw was inserted in fractured D12 vertebra (Fig. 5). On post-operative day 3, the patient was allowed to walk with the support of walker. Patient's general condition was fine and was pain free except for the operative site pain. The patient was started on antiosteoporotic treatment at the time of discharge. At present, i.e., 2 years after the revision surgery, the patient is pain free, is able to



Figure 2: Image showing implant failure due to backing out of pedicle screw from D11 vertebra.

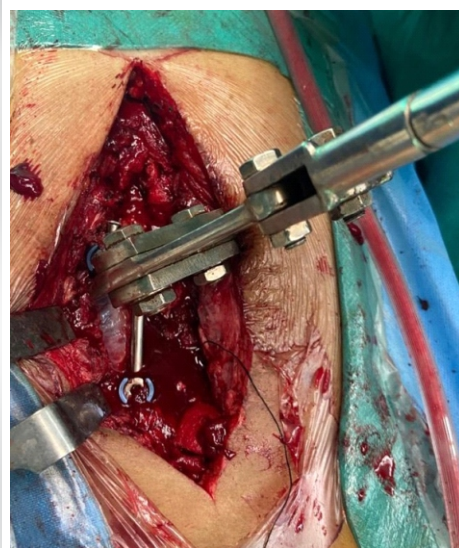


Figure 3: Image showing jumbo cutter being used to cut the rod.

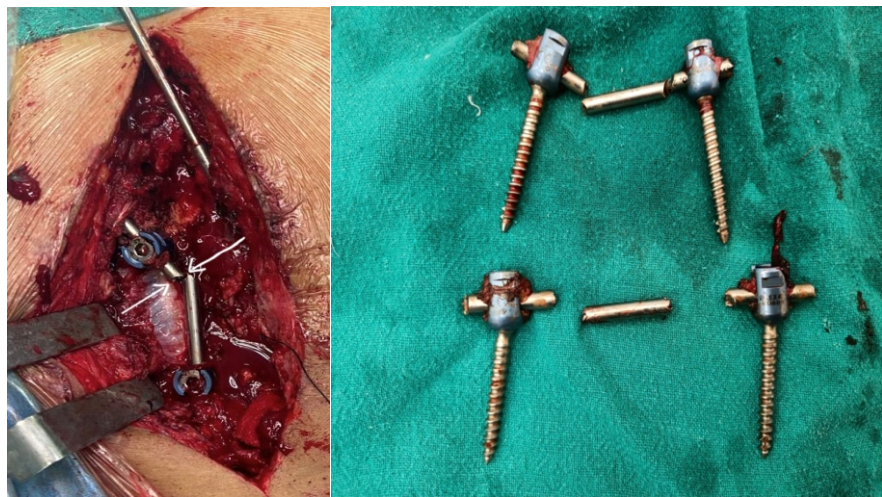


Figure 4: Pedicle screws with small piece of rods on their heads acting as a single unit.



Figure 5: Post-operative image after revision surgery.

walk without support, and has not reported any new complaint.

Discussion

The most common procedure done in the spine is pedicle screw fixation [6]. Post-fixation, the most common reasons for a second surgery are implant breakage, loosening, and pseudoarthrosis [7]. Among the many types of implant failure, removal of broken screw is the most difficult. Even if screws are intact, their removal can become tough when patient's medical records are not available, because of which instrumentation set to go toward cannot be marked out. Even if we have the instrument set of the concerned implant, screwdriver may not engage with the screw head because of a damaged cap screw head occurring in the last surgery.

When literature was surveyed, they were barely any information related to removing intact screws and whatever information was there required proper instruments. In U-rod technique described by Kose et al., surgeon used Allen key to remove cap screws and the screw is placed in the U-shaped rod after removing the rods [8]. Uvaraj and Bosco in his study first removed cap screw followed by connecting rod and after cutting rod to 25-mm length reapplied it over polyaxial screw head converting it into single system and then removed pedicle screw using counter torque wrench and appropriate size screwdriver [9]. However, the above methods will work only if cap screw holding the rod with the screw can be removed. In our case, even

the cap screw could not be removed due to screwdriver mismatch. Hence, we modified the technique in which we cut the rods near the pedicle screw head and then removed the screws. The same method has been mentioned by Ulus et al. using speed drill or circular saw [10]. However, in our case, we used a jumbo cutter to cut the rods which is easily available. Our screw remover design reduces the time and effort of surgery and also takes away the need to remove the fibrous tissue covering the cap screw heads and pedicle screw heads to engage the screwdriver.

Conclusion

Our screw removal technique which is useful and cost effective can help overcome the problem faced by surgeons during implant removal in revision surgeries working in peripheral centers or small cities where there are limited facilities in terms of instrumentation and availability of implants.

Clinical Message

Our technique of removing pedicle screws reduces the time and effort of surgery and also takes away the need to remove the fibrous tissue covering the cap screw heads and pedicle screw heads to engage the screwdriver.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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Consent: The authors confirm that informed consent was obtained from the patient for publication of this case report

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