Case Report | Journal of Clinical Orthopaedics | 2025 July-December; 10(2):116-118

Screwdriver Tip Breakage During Removal of 3.5 mm Locking Screw, an Unusual Complication: A Case Report

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Abstract

Introduction: Hardware removal after orthopaedic or fracture fixation surgeries, including locking plates and screws removal after fracture union, is a common practice; however, sometimes it is not as straightforward a procedure as it looks.

Case Report: We present a case of a male patient, 36 years old, who had a right tibial plateau fracture 2 years back, which was treated by open reduction and internal fixation using a locking 3.5 mm lateral proximal tibial plate. During hardware removal, we encountered an unusual complication: A breakage of the screwdriver tip.

Results: The screws were successfully removed after using a new screwdriver with no further complications.

Conclusion: Various unexpected circumstances might occur, such as damage or breakage of the screws heads or screwdriver tip, which hinders the complete removal of the hardware. The surgeon should be prepared with the proper tools to handle potential unusual situations.

Keywords: Hardware removal, Locking plates, Screws, Case report, Breakage.

Introduction

Hardware removal after fracture fixation is not as straightforward a procedure as it seems; however, some challenges and unexpected situations may arise [1, 2]. Furthermore, difficulties while removing locked plates and screws were reported, with a complication incidence reaching up to 38% [3].

Although there has been significant advancement in metallurgy, some issues related to locking plates and screws, such as seizing of locking screws into the holes, and screw head damage, make its retrieval after fracture union a challenging procedure [1,4].

To reduce the locking screws seizing issue, torque-controlled screwdrivers were recommended for locking screws insertion, thereby avoiding screw threads from jamming in the plate holes (cross-threading) [5].

Although screwdrivers are usually made of hard metal, unlike the locking screws' softer titanium alloy, this might not guard against destruction of the screwdriver tip. We aimed to describe an unusual case of screwdriver tip breakage during 3.5 mm locking screw removal.

Case Report

A male patient, 36 years old, who had a right tibial plateau fracture 2 years back, which was treated by open reduction and internal fixation using a locking 3.5 mm lateral proximal tibial plate (Fig. 1a). The patient presented with lateral knee and proximal tibial discomfort and asked for hardware removal.

The index surgery details were retrieved from the patient's record, and the implant type and the manufacturer were identified. A star-shaped tip screwdriver matching the screws heads was prepared aside (Fig. 1b), and the broken screws removal set was ready just in case it was required.

After exposure of the plate and screws through the same previous surgical incision, visual inspection of the screw heads showed no noticeable damage (Fig. 1c). So, we decided to use the screwdriver directly to remove the screws. However, after mounting the screwdriver into the screw head and starting the first turn, to try to unlock the screw, a snapping sound was heard,

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Submitted Date: 19 Jul 2025, Review Date: 12 Aug 2025, Accepted Date: 10 Sep 2025 & Published Date: 10 Dec 2025

Journal of Clinical Orthopaedics | Available on www.jcorth.com | DOI:10.13107/jcorth.2025.v10.i02.796

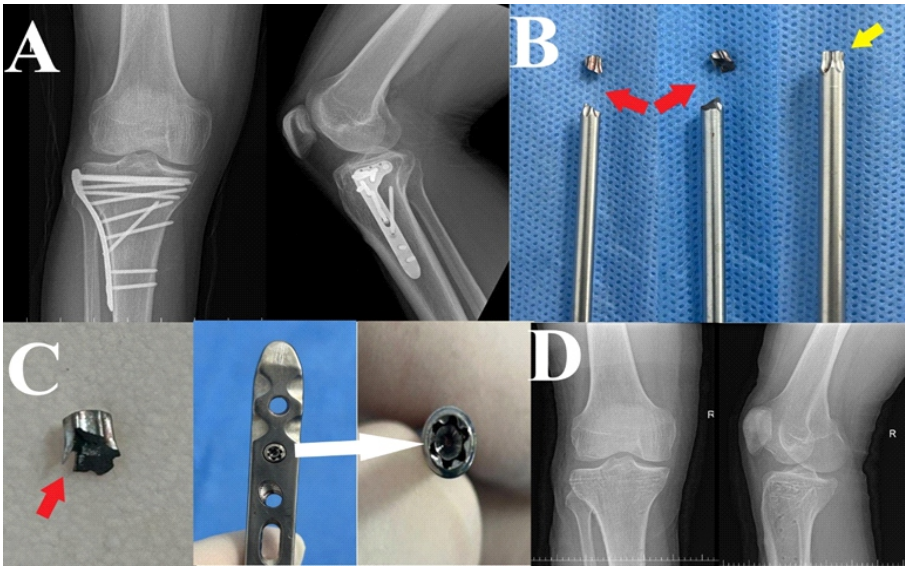

Figure 1: (a) pre-operative plain radiograph of the knee and proximal tibia (anteroposterior and lateral views) showing healed tibial plateau fracture fixed with proximal tibial locking plate and screws. (b) clinical images showing the broken screwdriver tip (red arrowheads) compared to an intact one (yellow arrowhead). (c) magnified image of the broken screwdriver tip (red arrowhead), and the plate and screws after removal showing a visually intact screw head (white arrow). (d) post-operative plain radiographs showing removal of all the retained hardware.

which was initially thought to be breakage of the screw head, but it turned out to be breakage of the screwdriver tip (Fig. 1b and c).

Another screwdriver was used efficiently to remove all the locking screws, followed by plate removal. The wound was irrigated and closed in layers. The postoperative plain radiograph showed successful removal of all retained hardware (Fig. 1d).

Discussion

We present this unusual case to highlight that unexpected circumstances can arise during an apparently easy and straightforward procedure, especially for junior orthopaedic surgeons. Instead of the commonly occurring scenario of screws breakage at the screw head and shaft junction, we experienced a failure and breakage at the screwdriver tip.

Hardware removal after fracture fixation surgeries has its own indications; however, this procedure can be challenging, and various techniques have been described to address the unusual circumstances occurring during surgery [2, 3, 5, 6, 7].

The surgeon should be prepared, starting with preoperative identification of the implant and its manufacturer, to determine the specific instruments needed for that implant. Furthermore, various sizes and shapes of screwdrivers and a broken screws removal set should be ready to be used [2, 7, 8].

Proper insertion of the locking screws and the use of a torque-controlled screwdriver should be ensured when using the locking plate and screws to facilitate future hardware removal if needed [5, 9].

The case we presented is considered relatively rare; however, when compared with other possible complications occurring during screws removal, such as screw jamming, cold welding, or screw-head failure [3, 7], we believe that the complication we are reporting could be easier to handle if an alternative and appropriately sized screwdriver was prepared.

Finally, we admit that the present report has some inherent limitations; one crucial issue is the possible intraoperative factors predisposing to screwdriver failure, such as applied torque, insertion angle, and the age or prior use of the screwdriver, which are not usually assessed during hardware removal surgery. Another point concerns the lack of mechanical or metallurgical analysis of the broken screwdriver, which limited our ability to determine the precise mode of failure. The last point was not providing a follow-up as we reported this incident, which did not affect the fracture union or patient outcomes, as the incident was related to safely removing the hardware, which was successfully performed.

Conclusion

Unusual incidents might occur during the removal of the locking plate and screws, such as breakage of the screwdriver tip. The surgeon should be prepared with the necessary instruments to overcome such unusual circumstances. Further studies evaluating possible factors leading to failure, such as insertion angle, applied torque, and screwdriver age, are warranted.

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

Conflict of Interest: NIL; **Source of Support:** NIL

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Conflict of Interest: NIL
Source of Support: NIL

How to Cite this Article

Khalifa AA, Al-Muhammad MK. Screwdriver Tip Breakage During Removal of 3.5 mm Locking Screw, an Unusual Complication: A Case Report. Journal of Clinical Orthopaedics. July-December 2025;10(2):116-118.