ISSN 2307-8960 (online)

World Journal of *Clinical Cases*

World J Clin Cases 2022 January 21; 10(3): 753-1139

Published by Baishideng Publishing Group Inc

World Journal of Clinical Cases

Contents

Thrice Monthly Volume 10 Number 3 January 21, 2022

World Journal of Clinical Cases

Thrice Monthly Volume 10 Number 3 January 21, 2022

Contents

World Journal of Clinical Cases

Thrice Monthly Volume 10 Number 3 January 21, 2022

Contents

Contents

Thrice Monthly Volume 10 Number 3 January 21, 2022

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, M Anwar Iqbal, PhD, Professor, Department of Pathology and Laboratory Medicine, University of Rochester Medical Center, Rochester, NY 14642, United States. anwar_iqbal@urmc.rochester.edu

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for *WJCC* as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The *WJCC*'s CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Ying-Yi Yuan*; **Production Department Director:** *Xiang Li*; **Editorial Office Director:** *Jin-Lei Wang*.

NAME OF JOURNAL
World Journal of Clinical Cases

ISSN
ISSN 2307-8960 (online)

LAUNCH DATE
April 16, 2013

FREQUENCY
Thrice Monthly

EDITORS-IN-CHIEF
Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/2307-8960/editorialboard.htm

PUBLICATION DATE
January 21, 2022

COPYRIGHT
© 2022 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS
https://www.wjgnet.com/bpg/gerinfo/204

GUIDELINES FOR ETHICS DOCUMENTS
https://www.wjgnet.com/bpg/GerInfo/287

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH
https://www.wjgnet.com/bpg/gerinfo/240

PUBLICATION ETHICS
https://www.wjgnet.com/bpg/GerInfo/288

PUBLICATION MISCONDUCT
https://www.wjgnet.com/bpg/gerinfo/208

ARTICLE PROCESSING CHARGE
https://www.wjgnet.com/bpg/gerinfo/242

STEPS FOR SUBMITTING MANUSCRIPTS
https://www.wjgnet.com/bpg/GerInfo/239

ONLINE SUBMISSION
https://www.f6publishing.com

© 2022 Baishideng Publishing Group Inc. All rights reserved. 7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
E-mail: bpgoffice@wjgnet.com https://www.wjgnet.com

World Journal of Clinical Cases

Submit a Manuscript: https://www.f6publishing.com

World J Clin Cases 2022 January 21; 10(3): 1116-1121

DOI: 10.12998/wjcc.v10.i3.1116

ISSN 2307-8960 (online)

CASE REPORT

New method to remove tibial intramedullary nail through original suprapatellar incision: A case report

Miao He, Jie Li

ORCID number: Miao He 0000-0001-5295-0882; Jie Li 0000-0002-3286-2006.

Author contributions: He M designed the case report; He M and Li J collected the data; He M analyzed the data and wrote the manuscript; All authors have read and approved the final manuscript.

Informed consent statement: Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflict of interest to disclose.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Country/Territory of origin: China

Specialty type: Orthopedics

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0

Miao He, Jie Li, Department of Orthopaedic Surgery, Chongqing Emergency Medical Center (Chongqing University Central Hospital), Chongqing 400010, China

Corresponding author: Miao He, MD, Doctor, Department of Orthopaedic Surgery, Chongqing Emergency Medical Center (Chongqing University Central Hospital), No. 1 Jiankang Road, Chongqing 400010, China. smalldaixin@163.com

Abstract

BACKGROUND

Since 2006, introducing a tibial intramedullary nail *via* the suprapatellar approach has been established; however, nail removal must be carried out using classic infrapatellar access, which can lead to complications. Here, we report a new method to remove the intramedullary nail through the original suprapatellar incision.

CASE SUMMARY

A 39-year-old man was hit by a vehicle in 2019. He was immobilized with a 10-mm × 330-mm tibial intramedullary nail *via* the suprapatellar approach due to left middle tibial fracture. Two years later, the patient requested for the implant to be removed. We used a new method to remove the tibial intramedullary nail through the original suprapatellar incision, and the operation went smoothly.

CONCLUSION

This case report indicates that suprapatellar access can be used to remove the intramedullary nail *via* the original incision without infrapatellar access, thus avoiding surgical complications.

Key Words: Suprapatellar approach; Nail removal; Infrapatellar access; Case report

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: A 39-year-old man was immobilized with a 10-mm × 330-mm tibial intramedullary nail *via* the suprapatellar approach due to left middle tibial fracture. The end cap of the nail was purposely not inserted. Two years later, we used a novel method to remove the tibial intramedullary nail through the original suprapatellar incision.

Grade B (Very good): B
Grade C (Good): 0
Grade D (Fair): 0
Grade E (Poor): 0

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: https://creativecommons.org/Licenses/by-nc/4.0/

Received: July 10, 2021
Peer-review started: July 10, 2021
First decision: September 28, 2021
Revised: October 11, 2021
Accepted: December 25, 2021
Article in press: December 25, 2021
Published online: January 21, 2022

P-Reviewer: Shekouhi R
S-Editor: Liu M
L-Editor: Wang TQ
P-Editor: Liu M

Citation: He M, Li J. New method to remove tibial intramedullary nail through original suprapatellar incision: A case report. *World J Clin Cases* 2022; 10(3): 1116-1121
URL: https://www.wjgnet.com/2307-8960/full/v10/i3/1116.htm
DOI: https://dx.doi.org/10.12998/wjcc.v10.i3.1116

INTRODUCTION

The advantages of intramedullary nail internal fixation, such as small trauma, central fixation, and closed reduction, are consistent with the biological osteosynthesis concept; thus, intramedullary nail internal fixation has become the gold-standard treatment for tibial shaft fracture[1].

Removal of the tibial intramedullary nail *via* the infrapatellar approach is simple, and it is performed under direct vision through the original incision. Thus, researchers tend to use the infrapatellar approach to remove the internal fixation inserted *via* the suprapatellar approach[2]; however, with this approach, new scars form, and the patellar ligament and the infrapatellar fat pad can become damaged[3].

The other option is to remove the tibial intramedullary nail *via* the suprapatellar approach. However, this method remains controversial because there are many difficulties in using the original incision to remove the internal fixation. In this paper, a quick and simple method of nail extraction *via* the original suprapatellar incision is proposed. To the best of our knowledge, this is the first report of this type of removal.

CASE PRESENTATION

Chief complaints

A 33-year-old man requested for the implant to be removed.

History of present illness

The patient who was hit by a car in 2019 had a history of multiple fractures. These fractures, including left mid-tibial fracture, were fixed with a 10-mm × 330-mm suprapellar tibial nail. The end cap of the nail was purposely not inserted. Two years later, the patient requested for the implant to be removed.

History of past illness

The patient had a history of internal fixation.

Personal and family history

The patient had no genetic or familial disease history.

Physical examination

Multiple surgical scars were visible on the left calf, and there was no sign of limited motion in the left knee joint.

Laboratory examinations

No abnormalities were observed on preoperative examination.

Imaging examinations

An X-ray examination showed that the broken end of the tibia had bony union (Figure 1).

FINAL DIAGNOSIS

The patient's final diagnosis was bony union after multiple fractures.

TREATMENT

The patient was examined before surgery and had no contraindications. After

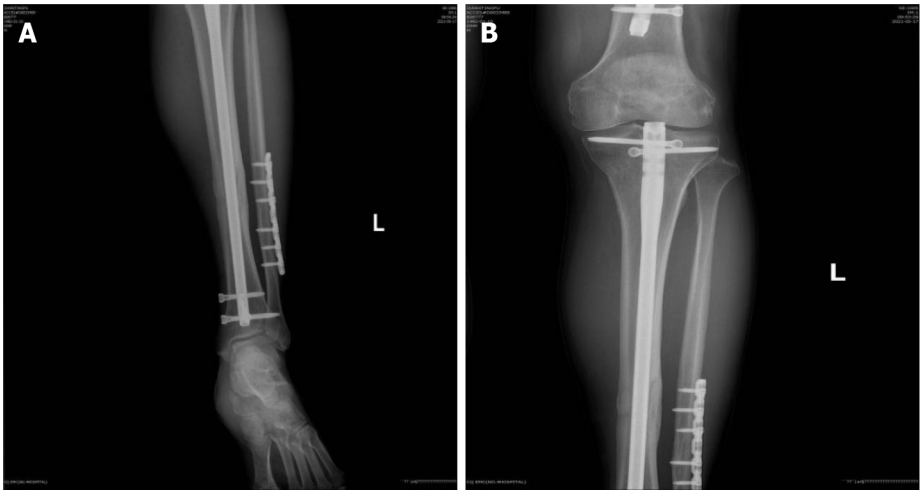

Figure 1 X-ray images of the patient's left proximal tibia. A: Antero-posterior X-ray view of the left proximal tibia showing complete bony union; B: Antero-posterior X-ray view of the left distal tibia showing complete bony union.

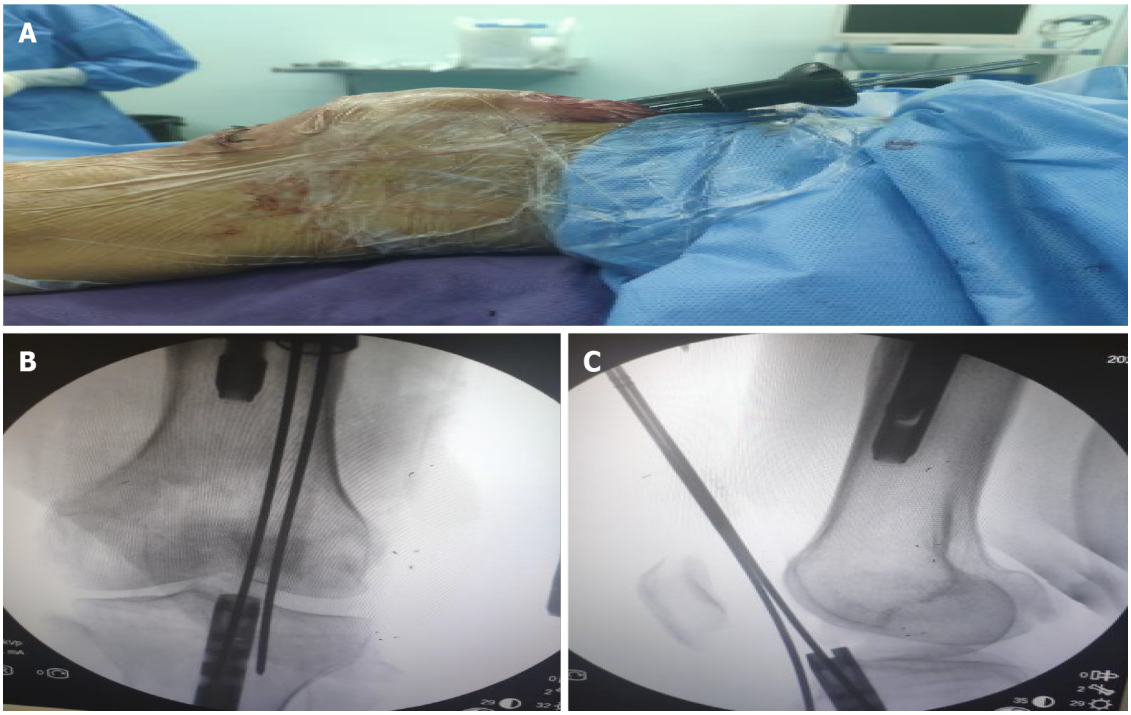

Figure 2 Insertion of the guide needle through the nail. A: The guide needle was inserted through the nail *via* the suprapatellar approach and was assisted by a multi-holed guide pin sleeve; B: Antero-posterior X-ray view showing insertion of the guide needle into the cavity of the intramedullary nail; C: Lateral X-ray view showing insertion of the guide needle into the cavity of the intramedullary nail.

administering epidural anesthesia, the proximal locking nail was removed. Then, the knee was bent 30°, and a multi-holed guide pin sleeve was fine-tuned to allow a 2-mm guide needle to be accurately inserted into the cavity of the intramedullary nail with a depth of at least 2–3 cm *via* the original suprapatellar incision. The results were confirmed by intraoperative X-ray (Figure 2). A hollow jig was used to screw the end of the nail along the guide needle. This process accurately removed the bone on top of the nail without damaging surrounding structures, such as the meniscus and ligaments. After the jig was screwed into the end of the intramedullary nail and tightened, intraoperative fluoroscopy was used for confirmation (Figure 3). The proximal and distal locking nails were removed, and the intramedullary nail was retracted using a mallet (Figure 4).

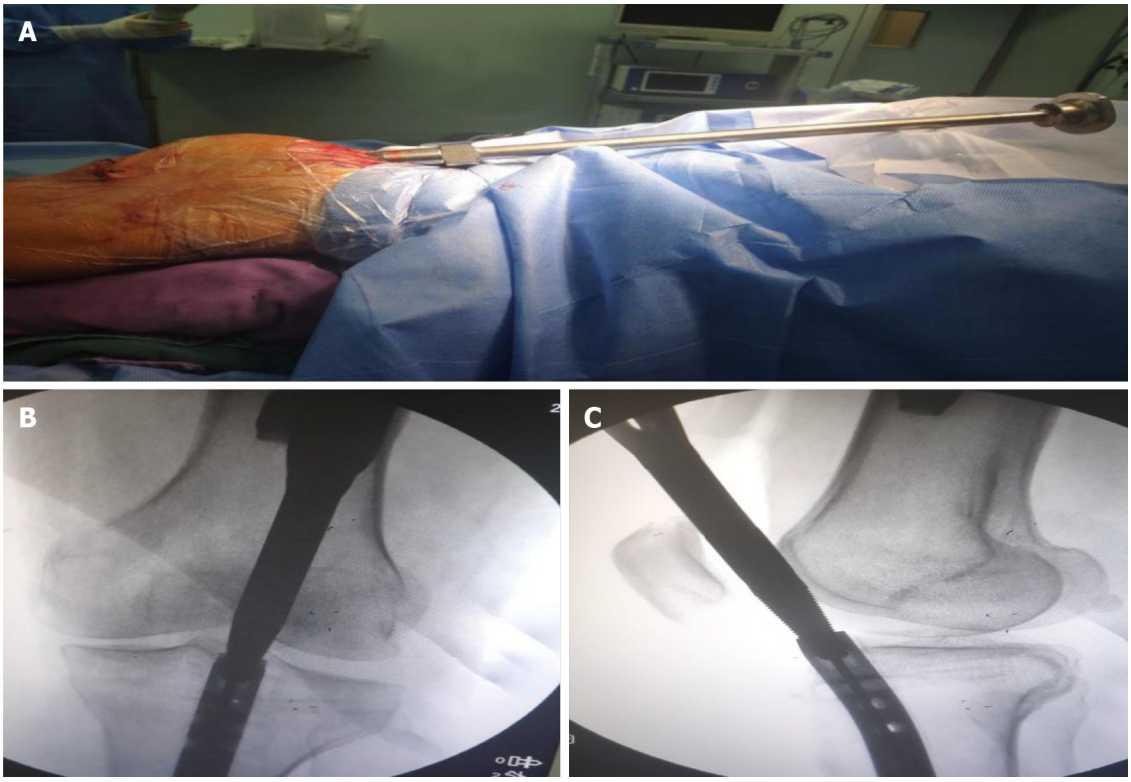

Figure 3 A jig was screwed into the tail of the nail. A: A hollow jig was rotated along the guide needle and screwed into the tail of the nail; B: Antero-posterior X-ray view showing that the clamp was screwed into the end of the intramedullary nail and tightened; C: Lateral X-ray view showing that the clamp was screwed into the end of the intramedullary nail and tightened.

Figure 4 The intramedullary nail was struck out of the tibia using a mallet through the suprapatellar approach.

OUTCOME AND FOLLOW-UP

Two weeks postoperatively, the patient's wound had healed well. At the 4-mo postoperative follow-up, the patient did not complain of pain in the left knee joint. The left knee could extend 0° and flex 120° (Figure 5). The Kujala score was 95 on the left knee.

DISCUSSION

Tibial intramedullary nail placement can be achieved by both suprapatellar and infrapatellar access. The suprapatellar approach has more advantages than the infrapatellar approach[4-8]; however, how best to remove the nail *via* the original suprapa-

Figure 5 Knee range of motion at the 4-mo follow-up.

tellar incision used for nail insertion is uncertain.

When using the traditional method to remove the intramedullary nail through the original suprapatellar incision, it is necessary to first remove the bone above the intramedullary nail with a hollow drill, remove the end cap, and take out the end of the intramedullary nail and screw it into the target device to remove the intramedullary nail. Because the whole process is not performed under direct vision, the operation is difficult and time-consuming. The main difficulty lies in how to accurately remove the bone above the intramedullary nail. If care is not exercised, the meniscus and anterior and posterior cruciate ligaments can become damaged. The cap should then be safely removed without being lost in the joint space. Therefore, most surgeons have no choice but to use the infrapatellar access to remove the internal fixation, but this often leads to new scar formation. Moreover, surgical incision can also damage the saphenous nerve, the patellar ligament, and the infrapatellar fat pad, resulting in a high probability of postoperative knee pain.

A previous study has shown that the end cap of an intramedullary nail stops bony in-growth of tissue[9]. To facilitate the method presented in this paper, the end cap was not used in the initial nail placement, and bony in-growth of tissue enclosed the end of the nail. To remove the tibial intramedullary nail, a guide needle was inserted into the cavity of the intramedullary nail. The results were confirmed by intraoperative X-ray. A hollow jig was used to screw the end of the nail along the guide needle. This process accurately removed the bone on top of the nail. Thus, the difficulty in removing the nail *via* the original incision was greatly reduced. The whole process was easy, and no special tools were needed. Due to the use of a sleeve during surgery to protect important tissues within the joint, the likelihood of damage to the patellofemoral joint was greatly reduced.

However, this novel approach has some potential limitations that should be noted. First, removal of the bone above the intramedullary nail may lead to possible entry of large bone fragments into the articular cavity. Second, after intramedullary nail removal, the intramedullary content entering the joint cavity may lead to joint cavity extravasation and increase the risk of infection.

CONCLUSION

In this study, removal of the intramedullary nail *via* the original suprapatellar incision

was simple and reliable, did not require special equipment, and did not require infrapatellar access, which reduced the likelihood of complications.

ACKNOWLEDGEMENTS

The authors would like to thank the patient for providing consent for publication of this case report and accompanying images.

REFERENCES

1 **Bode G**, Strohm PC, Südkamp NP, Hammer TO. Tibial shaft fractures - management and treatment options. A review of the current literature. *Acta Chir Orthop Traumatol Cech* 2012; **79**: 499-505 [PMID: 23286681]

2 **Noia G**, Fulchignoni C, Marinangeli M, Maccauro G, Tamburelli FC, De Santis V, Vitiello R, Ziranu A. Intramedullary nailing through a suprapatellar approach. Evaluation of clinical outcome after removal of the device using the infrapatellar approach. *Acta Biomed* 2018; **90**: 130-135 [PMID: 30715011 DOI: 10.23750/abm.v90i1-S.8014]

3 **Katsoulis E**, Court-Brown C, Giannoudis PV. Incidence and aetiology of anterior knee pain after intramedullary nailing of the femur and tibia. *J Bone Joint Surg Br* 2006; **88**: 576-580 [PMID: 16645100 DOI: 10.1302/0301-620X.88B5.16875]

4 **Chan DS**, Serrano-Riera R, Griffing R, Steverson B, Infante A, Watson D, Sagi HC, Sanders RW. Suprapatellar Versus Infrapatellar Tibial Nail Insertion: A Prospective Randomized Control Pilot Study. *J Orthop Trauma* 2016; **30**: 130-134 [PMID: 26894640 DOI: 10.1097/BOT.0000000000000499]

5 **Wang C**, Chen E, Ye C, Pan Z. Suprapatellar *vs* infrapatellar approach for tibia intramedullary nailing: A meta-analysis. *Int J Surg* 2018; **51**: 133-139 [PMID: 29367045 DOI: 10.1016/j.ijsu.2018.01.026]

6 **Gao Z**, Han W, Jia H. Suprapatellar *vs* infrapatellar intramedullary nailing for tibal shaft fractures: A meta-analysis of randomized controlled trials. *Medicine (Baltimore)* 2018; **97**: e10917 [PMID: 29901581 DOI: 10.1097/MD.0000000000010917]

7 **Chen X**, Xu HT, Zhang HJ, Chen J. Suprapatellar *vs* infrapatellar intramedullary nailing for treatment of tibial shaft fractures in adults. *Medicine (Baltimore)* 2018; **97**: e11799 [PMID: 30095643 DOI: 10.1097/MD.0000000000011799]

8 **Williamson M**, Iliopoulos E, Williams R, Trompeter A. Intra-operative fluoroscopy time and radiation dose during suprapatellar tibial nailing *vs* infrapatellar tibial nailing. *Injury* 2018; **49**: 1891-1894 [PMID: 30017180 DOI: 10.1016/j.injury.2018.07.004]

9 **Underwood J**, Chakrabarti AJ. A 'Seldinger' method to facilitate accurate placement of an end cap following femoral nailing. *Ann R Coll Surg Engl* 2006; **88**: 225-226 [PMID: 17387814 DOI: 10.1308/rcsann.2006.88.2.225]

Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: bpgoffice@wjgnet.com
Help Desk: https://www.f6publishing.com/helpdesk
https://www.wjgnet.com

© 2022 Baishideng Publishing Group Inc. All rights reserved.