Author's response to reviews

Title: Implantation of Intertan for the intertrochanteric fracture: Pitfalls and Recommendations - A case series

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Author's response to reviews: see over
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Reviewer’s report

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Response to reviewer # 1 (Dr Ibrahim Azboy):

Introduction

1. Case 1 “Define the second entry position for nail insertion. Generally in the two entry position becomes a large one entry. Did you observed this in this case”

   We followed this constructive advice and described the implantation strategy according to the anatomical specificity in figure legends 1. Furthermore, the proximal femoral fracture is stable with the achievement of the proximal and distal locking despite the bone loss of the proximal femur that is caused by the shift of the entry point.

2. Case 2 “Line 3,”“We opened the proximal femur and inserted a 12.5mm entry reamer to the lesser trochanter.” It should be changed with “greater trochanter”

   We have revised the term according to the reviewers’ advice.

3. Case 3 Why did you observed the iatrogenic fracture?. Define the reason”

   We are sorry for missing this important content. Information is added as the following “When the final x-ray test was taken to confirm the position, iatrogenic fractures of the distal femur was observed. The original short TRIGEN Intertan nail and the capturing locking screw was removed. After then, a long Intertan nail was implanted to fix the iatrogenic fracture”.
4. Case 4

Line 4: “pin” should be changed with “nail”. When fracture was observed. The sentences should be re-ordered. The solution for fracture should be stated”

Thanks for the reviewer’s careful check. The solution for iatrogenic fracture has been complemented in the revised version. “An open reduction followed using locking fixation plate to manage the femoral shaft fracture”.

5. “Line 3. From the inception of dynamic hip screw (DHS), such fixtures have become the gold standard for the treatment of intertrochanteric fractures [5-7]. After this statement you should argue the indication of intramedullary nails. The superiorities and inferiorities”

We appreciate this constructive suggestion and discussed the indication of intramedullary nails, the superiorities and inferiorities. And the discussion is the following below

In patients with stable fractures such device produces excellent results. However, in patients with unstable fractures, the dynamic hip screw and plate are associated with an increased prevalence of complications such as cut-out, shaft medialization, shortening, and subsequent loss of reduction. For these reasons, there has been a sustained interest in the use of an intramedullary nail to treat proximal femoral fractures. However, intramedullary method therapy for trochanteric fractures requires extensive surgical experience. The incidence of complications, e.g. cut-out, femoral shaft fractures, and the learning curve has resulted, in the past, in the loss of popularity for these devices.

With the axial biomechanical advantages of the intramedullary nail, a series of intramedullary fixation implants evolved from Gamma nail, PFN and PFNA to the latest TRIGEN INTERTAN nail. With the unique integrated, interlocking screw constructs, TRIGEN INTERTAN nail provides all the benefits of a traditional surgical approach for the antegrade intramedullary nail, and also increases the stability and the resistance for the intraoperative and post-operative femoral head rotation. Furthermore, the Intertan compression screw is always against the nail so the medial migration is impossible; thus, eliminating the Z-effect. For the above reasons, TRIGEN INTERTAN is technically an ambitious operative procedure for the treatment of intertrochanteric fractures; however, information about the intraoperative technical complications of implantation are hardly ever been reported.

Response to reviewer # 2: (Dr Rehan Haq)
1. “Design of the nail to be discussed in detail.”

Discussion section 2\textsuperscript{nd} paragraph

We appreciate the referee for these valuable comments. Information about the design of the Intertan is complemented in the revised version.

With the axial biomechanical advantages of the intramedullary nail, a series of intramedullary fixation implants evolved from Gamma nail, PFN and PFNA to the latest TRIGEN INTERTAN nail. With the unique integrated, interlocking screw constructs, TRIGEN INTERTAN nail provides all the benefits of a traditional surgical approach for the antegrade intramedullary nail, and also increases the stability and the resistance for the intraoperative and post-operative femoral head rotation. Furthermore, the Intertan compression screw is always against the nail so the medial migration is impossible; thus, eliminating the Z-effect. For the above reasons, TRIGEN INTERTAN is technically an ambitious operative procedure for the treatment of intertrochanteric fractures; however, information about the intraoperative technical complications of implantation are hardly ever been reported.

2. Case 1
In a stable 31\ A 1.3 fracture in short obese patient what was the need to use an intramedullary device. A DHS could have been used”

Thanks for reviewer’s comments. For the axial biomechanical advantages of intramedullary nail, intramedullary fixation implants are preferred in our hospital. DHS is of course suitable for these stable intertrochanteric fractures.

3. “Case 2, 3, 4 could the fracture had been avoided if other implant like PFNA2 were used which is specifically designed for the Asian femora.”

We agree with the reviewer’s opinion. PFNA2 is specifically designed for Asians and it has better geometric match with Asian femur. For the unique integrated, interlocking screw constructs, TRIGEN INTERTAN nail provides all the benefits of a traditional Antegrade Intramedullary nail surgical approach, while also increasing stability and resistance to intraoperative and post-operative femoral head rotation. Furthermore, the Intertan compression screw is always against the nail so medial migration is impossible, eliminating the Z-effect. For the above reasons, we had adjusted the implanting strategy without changing to the PFNA2 or thinner nail.
Journal Format: Please also ensure that your revised manuscript conforms to the journal style

1. Please include the study design in your title, i.e. Case report. For example: A presenting with B in C: a case report. (e.g., A case of massive GI bleeding in a patient with 2 small AVMs in the small intestine).

2. Please include all the patients’ ages in the abstract section.

**Case Presentation**

We report four cases with intraoperative difficulties during the implantation of Intertan nails among Han Chinese patients from China Mainland. In Case 1, 75 yrs old female patient-while during the operation a thorough observation was performed of the anatomical specificities for the excessive femoral shaft curvation at the coronal and sagittal planes; furthermore, relatively smooth implantation was achieved by adjusting the entry point. In Case 2, from the fat interference perspective, Intertain nail was implanted at an oblique angle in an obese 64 years old female patient, which resulted in iatrogenic fracture of the proximal femur. In Case 3, iatrogenic fracture of the distal femur developed in an 83 years old female patient because of the violent hammering and underestimating of the bone fragility in an. In Case 4, an iatrogenic fracture occurred in a 40 years old female patient around the distal locking slot during the drilling process.

3. Please include a Case Presentation section header.

   **Done as observed above in point 2**

4. Please include the Ethnicity of the patient in the Case presentation section.

   **Done - Chinese Han Patients as observed in point 2**

5. Please include a list of abbreviations used in the manuscript and their meanings after the Conclusions section.

   **Done**

**Abbreviations & Acronyms**

- AP Antero-Posterior
- DHS dynamic hip screw
- Proximal Femur nail (PFNA)
- Proimal Femoral nail (TFN)

- AO Classification of Fractures
- A1: Simple (2 fragment) pertrochanteric fractures
A1.3: hip fracture: A1.3 fractures, where the fractures are below the lesser trochanter
A2 Multifragmentary pertrochanteric
A2.1 With one intermediate fragment (Lesser trochanter detachment)
A2.2: With 2 Intermediate fragments
A3: Intertrochanteric fractures
A3.1 Intertrochanteric fractures-simple, oblique

6. Please ensure that each figure should be closely cropped to minimize the amount of white space surrounding the illustration.

We have cropped the illustrations in order to minimize the white space surrounding the images in the last revision. I hope it is satisfactory because we cannot minimize further more than this level.

The manuscript has been edited and proof read thoroughly intensively and it is at the professional level.

In summary, we have made major modifications in the revised version of the manuscript which are based on the reviewers’ comments and according to the template of the journal based on the editorial office, which makes the revised version of the manuscript much clearer. We here again express our sincere thanks to the editor and the reviewers for their great input and effort to improve this Case Series.

Yours Sincerely,
Yuancheng Li
Professor of Orthopaedics