



Planning And Pitfalls In Peri-Implant Fracture Fixation

¹Dr. Lahoti Rishabh Harnarayan, ²Dr. Ashok Thudukuchi Ramanathan, ³Dr. T.Munirathnam Naidu, ⁴Prof. P. Gopinath Menon

¹Junior Resident, ²Associate Professor, ³Senior Consultant, ⁴Professor
^{1,2,4}Department of Orthopaedic Surgery,

Sri Ramachandra Institute Of Higher Education and Research, Porur, Chennai-600116, Tamilnadu,

³Garuadri Hospital, Tirupathi, Andhra Pradesh.

***Corresponding Author:**

Dr. Lahoti Rishabh Harnarayan

Junior Resident In Orthopaedics, Sri Ramachandra Institute Of Higher Education And Research,
Porur, Chennai-600116. Tamilnadu.

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Introduction: Peri-implant fractures are on rise in modern orthopaedics and a challenging problem for surgeons.

Case Scenario: An elderly lady with Right femur DCS insitu, came with Right shaft of femur fracture. To achieve fracture fixation, a tailor made treatment protocol was made and fracture was fixed using retrograde nail.

Conclusion: Every peri-implant fracture is unique in nature and hence should have a specific management plan, considering the pervious implant status and patient condition

Keywords: Peri-implant fracture, Customized implant selection, pre operative planning

Introduction

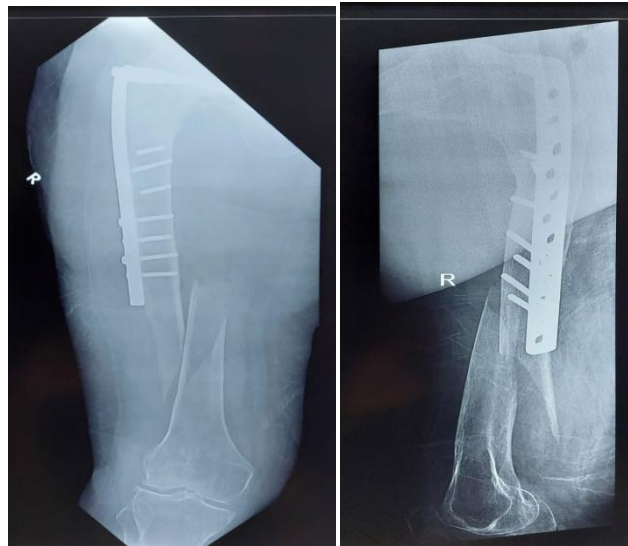
Peri-implant fractures are defined as a fracture of a bone with implant insitu. It's on rise due to increase in operative management in orthopaedics and aging population. Invention of newer implants with advance technologies and variable options built within, has helped us a lot with managing this kind of fractures. But using conventional implants in resource limited settings is one of the most important aspects in this kind of situations.

Case Scenario:

A 74 years old Lady presented to ER with chief complaints of pain over Right thigh and inability to weight bear on her Right Lower limb since 2 days.

History of trauma (slip and fall) at home on 23/11/2021 and sustained a closed injury to her Right thigh. Patient was diagnosed to have a right distal femur fracture. Patient was walking full weight bearing without support before trauma.

Past history of Right proximal femur fracture in July 2014 and was operated for same with proximal femoral plate and screws. In February 2015, patient presented to OP with difficulty in walking and pain over Right hip since 1month with no history of recurrent trauma. X-rays were taken and patient was diagnosed to have Right hip implant failure. Hence, she underwent Right hip Implant exit with DCS (Dynamic Condylar screw) fixation in February 2015 after which she gradually started mobilisation.



Classification:

Type A, fractures at the proximal end of the femur.

Type B, fractures located at the tip of the implant.

Type C, fractures distant from the implant

Type D relates to a specific pattern of subtrochanteric fracture secondary to the screws used for subcapital femoral fractures

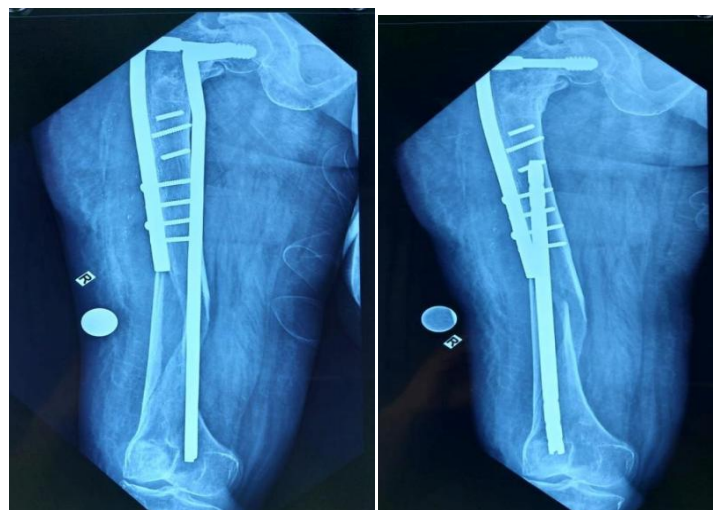
Type E, fractures through an implant with good anchorage where the healing process of the previous fracture was almost or completely concluded.

Challenges:

- 1) Patient had a malunited Right proximal femur fracture (Coxa Vara) with implant insitu.
- 2) Fracture was distal to the implant (spiral fracture distal to the implant) (Type CPP / Type P1B)
- 3) Osteoporotic bone
- 4) Elderly age

Pre -operative planning:

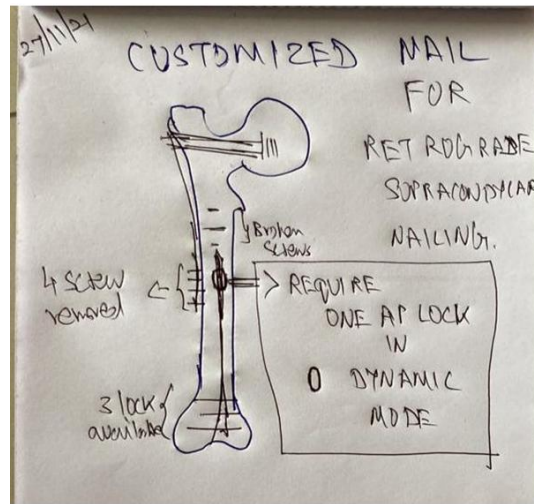
- 1) *Pre operative X-rays:* X-rays taken with a coin in the frame to rule out the magnification error and to get the correct length of bone and to determine the length of implant to be used.



2) Choice of implant: Both nail and plates were taken into considerations, but as there was a previous malunited fracture, an osteoporotic bone and fracture closed to previous implant, nail was decided as a choice of implant.

3) Type of nailing: Retrograde nailing was the chosen technique because,

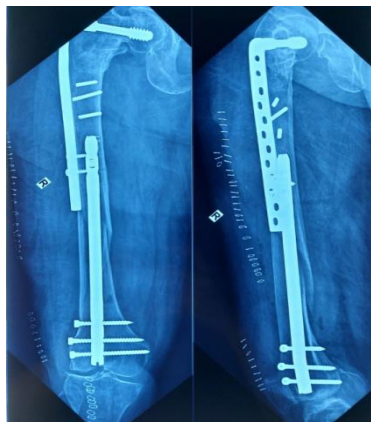
- a) Malunited proximal femur fracture making it difficult for antrograde nailing. b) Risking the removal of previous implant and disturbing the dynamics.
- c) Broken screws.
- 4) Customization of implants: With available retrograde nail lengths by prior checking with pre-fixation X-rays, locking is not possible from lateral to medial with presence of plate. ONE ANTEROPOSTERIOR locking in the desired length of selected retrograde nail in DYNAMIC mode was pre-ordered to the implant company especially for this scenario.
- 5) Back-up Plan: Long lateral column distal femur plates, long DCS and external fixator were arranged.



Intra operative management:

Intra-operatively – Patient was in supine position on OT table. Through previous scar, incision was made on the middle 3rd region of right thigh. Four distal screws of the DCS implant were removed intoto. Through midline incision of 1x3cm over right patellar tendon, checked under C-arm the apex of intercondylar notch was identified and drilled into medullary canal of femur, hand reamer was passed and confirmed, ball tip guide wire was passed through till the subtrochanteric region. Following serial reaming of right distal femur upto 12.5mm,

retrograde femur pre-ordered nail 240x12mm was introduced was fixed with 2 transverse locking at the condylar region and one customised antero-posterior locking through the nail at region of mid shaft level. Then, two screw removed from the plate was re-inserted abutting the nail for a double implant construct. Wound closed in layers with drain insitu. Serial dressings were done, wound found to be clean and healthy. Patient was made ambulant non weight bearing walking on Post op day 3, and discharged following suture removal.



Conclusion:

1. Templating in trauma with or without bone models of the broken bone to be recommended with ease of availability for better addressing the problem.
2. Pre operative planning with proper measurements and implant selection to avoid intra-operative complications.
3. Prior adequate X-rays and CT to be taken to understand the fracture pattern better.
4. Patient treatment plan to be tailor made with all the objective of the treatment predefined.

Future recommendations:

1. Establishing a Bone model facility at tertiary care centre will be a boon in future, for addressing the complexity of fracture and its pattern.
2. Bone model templating in trauma, to be considered as an allied orthopaedic field to be started on full-time basis with full-fledged functioning at institutional level and higher trauma centre for effective planning, implementation and delivery of trauma practices.

References:

1. Videla-Cés M, Sales-Pérez J-Miguel, Sánchez-Navés R, Romero-Pijoan E, Videla S, Proposal for the Classification of Peri-Implant Femoral Fractures: Retrospective cohort study, *Injury* (2018), <https://doi.org/10.1016/j.injury.2018.10.042>
2. Lester W. M. Chan¹ · Antony W. Gardner² · Merng Koon Wong³ · Kenon Chua¹ · Ernest B. K. Kwek¹ · on behalf of the Singapore Orthopaedic Research Collaborative (SORCE), Non-prosthetic peri-implant fractures: classification, management and outcomes, *Orthopaedic and Trauma Surgery* (March 2018), <https://doi.org/10.1007/s00402-018-2905-1>
3. Griffin XL, Parsons N, Zbaida MM, McArthur J. Interventions for treating fractures of the distal femur in adults. *Cochrane Database Syst Rev.* 2015 Aug 13;(8):CD010606. doi: 10.1002/14651858.CD010606.pub2. PMID: 26270891.
4. Griffin XL, Costa ML, Phelps E, Parsons N, Dritsaki M, Png ME, Achten J, Tutton E, Lerner R, McGibbon A, Baird J. Retrograde intramedullary nail fixation compared with fixed-angle plate fixation for fracture of the distal femur: the TrAFFix feasibility RCT. *Health Technol Assess.* 2019 Sep;23(51):1-132. doi: 10.3310/hta23510. PMID: 31549959; PMCID: PMC6778843.
5. Kesemenli, C.C., Tosun, B. & Kim, N.S.Y. A comparison of intramedullary nailing and plate-screw fixation in the treatment for ipsilateral fracture of the hip and femoral shaft. *Musculoskelet Surg* 96, 117–124 (2012). <https://doi.org/10.1007/s12306-012-0206-3>
6. Shah S, Desai P, Mounasamy V. Retrograde nailing of femoral fractures: a retrospective study. *Eur J OrthopSurgTraumatol.* 2015 Aug;25(6):1093-7. doi: 10.1007/s00590-015-1658-6. Epub 2015 Jul 1. PMID: 26126587
7. Zlowodzki M, Vogt D, Cole PA, Kregor PJ. Plating of femoral shaft fractures: open reduction and internal fixation versus submuscular fixation. *J Trauma.* 2007 Nov;63(5):1061-5. doi: 10.1097/TA.0b013e318154c0b4. PMID: 17993951.
8. Hak DJ, Rose J, Stahel PF. Preoperative planning in orthopedic trauma: benefits and contemporary uses. *Orthopedics.* 2010 Aug;33(8):581-4. doi: 10.3928/01477447-20100625-21. PMID: 20704156.
- 9) Mishra A, Verma T, Vaish A, Vaish R, Vaishya R, Maini L. Virtual preoperative planning and 3D printing are valuable for the management of complex orthopaedic trauma. *Chin J Traumatol.* 2019 Dec;22(6):350-355. doi: 10.1016/j.cjtee.2019.07.006. Epub 2019 Sep 7. PMID: 31668700; PMCID: PMC6921216