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Case Report

Osteosynthesis Failure in a Lower Limb Open Fracture: Knee Megaprosthesis Implant and Ipsilateral Total Hip Replacement – A Case Report

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Abstract

We present the case of a 44-year-old male with a complex orthopedic history following a major trauma in 2018, which resulted in comminuted fractures of the distal femur and tibial plateau. Following the initial surgical treatment, the patient later developed a hypertrophic aseptic nonunion of the distal femur, treated with revision of the osteosynthesis with a new plate. In 2021, he underwent osteosynthesis with three cannulated screws for a non-displaced medial femoral neck fracture. Approximately 4 months later, a peri implant infection due to *Staphylococcus aureus* was diagnosed, confirmed by positive labeled leukocyte scintigraphy, leading to removal of all hardware in 2022. Two months later, the patient presented with left knee pain without trauma and was diagnosed with a distal femoral stress fracture on pre-existing hypertrophic nonunion. Surgical treatment included implantation of a distal femoral modular megaprosthesis. In 2024, despite good knee function, the patient reported left hip pain; after thorough clinical and radiological assessment, a total hip arthroplasty was performed adding a trochanteric plate. The patient currently shows good overall joint function.

Keywords: *Polytrauma, Knee Replacement, Megaprosthesis, Hip Replacement, Periprosthetic*

Introduction

Presentation of a clinical case of an open lower limb fracture following a car accident (motorbike vs car) with subsequent implant of knee megaprosthesis (LINK MegaC ©) after two failed osteosynthesis (performed in another hospital with infection and nonunion) and implant of a total hip arthroplasty on the same side, due to avascular necrosis of the femoral head (ADLER PARVA and FIXA T-PORE ©). Additionally, to the hip arthroplasty, it was planned the implant of a proximal femoral plate with a trochanteric hook. It was done an approximate preoperative digital planning as far as the knee prosthesis is concerned (due to high variability of bone stock intra-op, hence different probable femoral resection), instead a full digital planning was performed before the second surgery.

Case Presentation

We herein present a case of a 40-year-old male who presented to the emergency department about an hour after being involved in motor traffic accident in a semiconscious state. He had multiple left lower limb fracture (open fracture of distal femur, patella, proximal third of the tibia (33C3 + 41B3 + 4F1B, G II with EPS damage). He was treated with temporary bridge knee ex fix and VAC dressing, k wires on the patella and cannulated screws on the tibial plateau. (Fig. 1)

After second looks and 30 days it was performed a definitive osteosynthesis of the femur with plate, scews and equine bone splint. (Fig. 2)

After 4 months the patient felt his knee collapsing while walking (at p.e. severe functional limitation of the knee, swollen knee, no fever). After arthrocentesis, *S. Aureus* was isolated. It was then performed in another hospital a second osteosynthesis after antibiotics.

After 2 months the patient fell down and underwent a osteosynthesis of the left femoral neck fracture (Garden II) with 3 cannulated screws. (Fig. 3 and Fig. 4)

3 Months after, because of persistent pain, fevers and severe functional loss, it was diagnosed an osteomyelitis (lab exams and scintigraphy) thus all the hardware was removed. (Fig. 5)

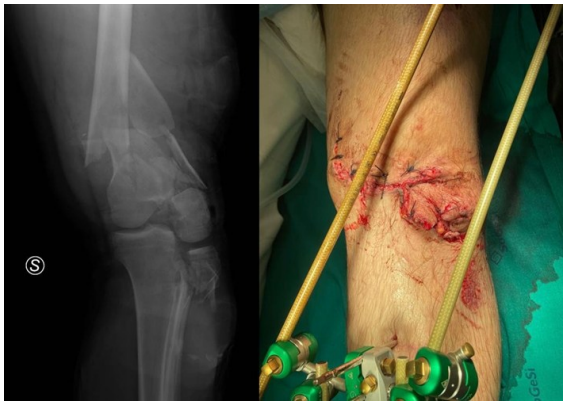

Fig 1. *Damage control external fixation for the open lower limb fracture.*

Fig 2. *First osteosynthesis with distal femoral plate and bone splint.*

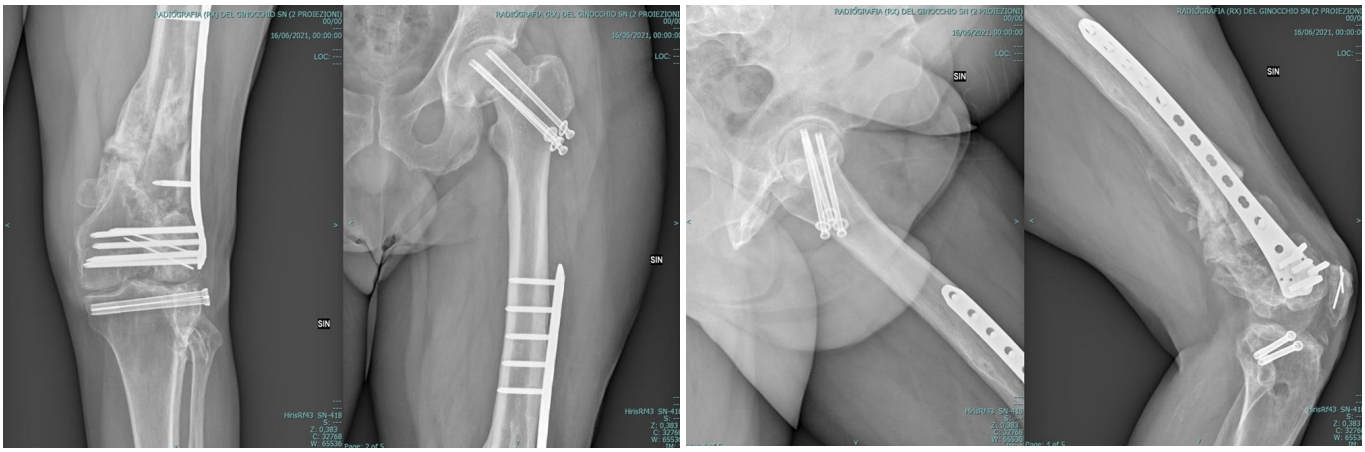

Fig 3&4. *Second osteosynthesis with longer and thicker plate + 3 cannulated screws on the femoral neck for Garden II fracture.*

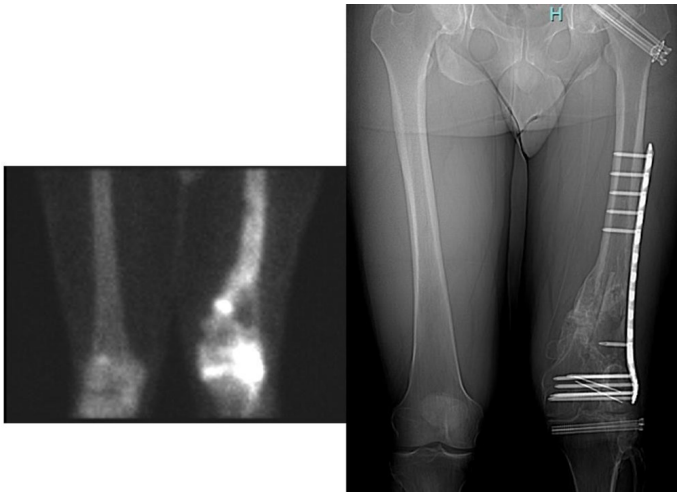

Fig 6. *Scintigraphy previously removing hardware.*

The patient finally came to our clinic with a severe clinic and radiography hypertrophic pseudoarthrosis (**Fig. 6**) of the distal femur which we treated with wide resection of the femur and implant of a knee Megaprosthesis with an extensor apparatus tensioning. (Fig. 7,8,9)

After 2 years (2024) and after recurring and persistent pain to the left hip, we found out with an MRI about an AVN of the left femoral head. After careful pre-op planning, it was then performed a total hip arthroplasty with a small femoral stem. (Fig. 10)

We noted an area of least resistance between the two implants, so we implanted as well as proximal femur neutralization plate without cerclages, to preserve the periosteum. (Fig. 11,12,13)

At the last follow up (2 years knee, 1 year hip) the patient presents a good function of the lower limb and quality of life, he is satisfied with his mobility (Harris Hip score went from 36.5 pre op, to 88 post op). (Fig. 14 and 15)

Fig 7. *Nonunion and hypertrophic pseudoarthrosis.*

Fig 8. *Knee Megaprosthesis details.*

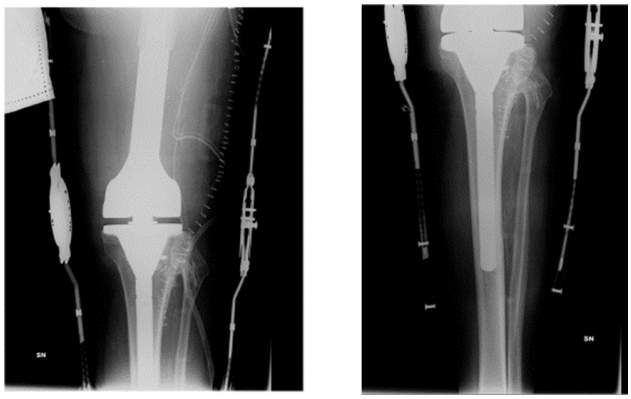

Fig 9. *Post-op X rays after knee replacement.*

Fig 10. *X rays 3 months post-op.*

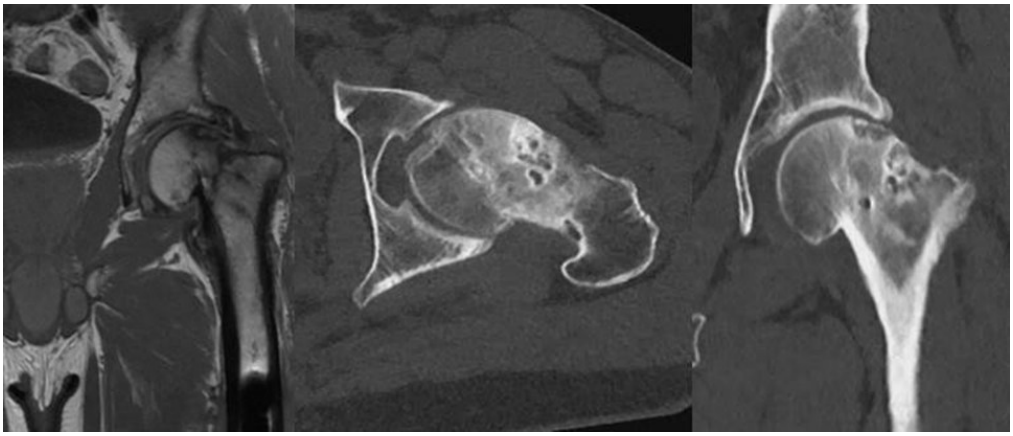

Fig 11. *Imaging details, TC/MRI of geode and avascular necrosis of femoral head.*

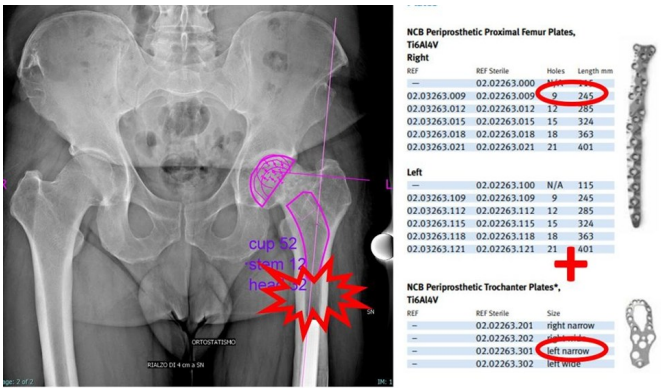

Fig 12. *Planning for THA.*

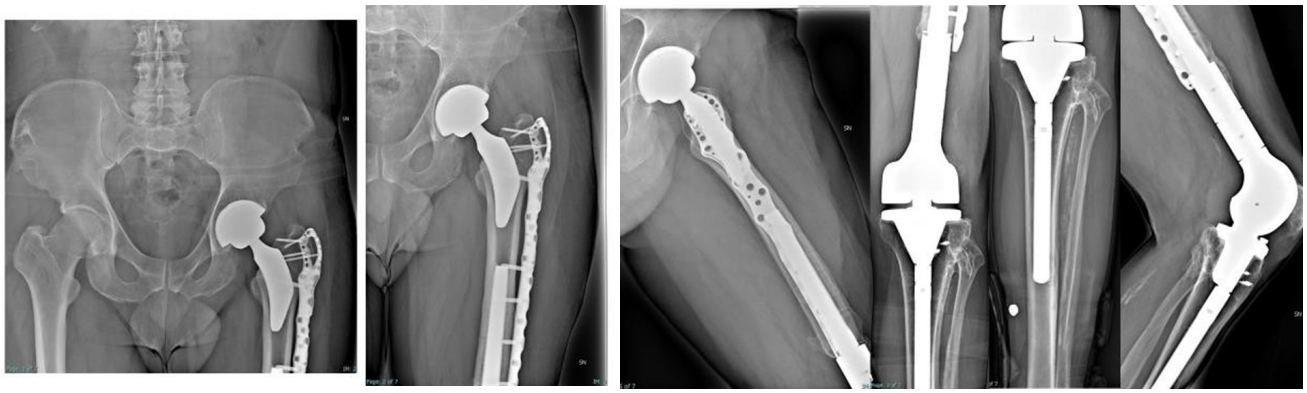

Fig 13 and 14. *Post-op X rays after THA.*

Fig 15. *Functional outcome 1 year after THA and 2 years after TKR.*

Fig 16. *Orthostasis X ray of latest follow up.*

Discussions

When the patient came to our attention, it was because every specialist proposed the patient over the knee amputation, but because of the young age, high functional request and motivation of the patient we went for joint replacement with a tumoral approach [1]. Before proceeding with surgery, considering the complex surgical and anamnestic history we ruled out any kind of infection with scintigraphy, lab markers (VES, PCR, leucocytes), arthrocentesis and synovial biopsy preoperatively and then we proceed to implant the Knee Megaprosthesis.

As far as the hip replacement is concerned, we ruled out the option of a total femur megaprostesis to preserve the muscular function of the young patient [2,3], and a hip resurfacing arthroplasty considering the contraindications (inadequate bone stock to support the device, multiple cysts to CT scan, low baseline HHS, leg length discrepancy >1 cm, osteonecrosis of femoral head >50%). [4] The chosen type of prosthesis could have been utilized doing a conservative cut on the neck.

However, due to the poor quality of the femoral neck and the presence of geodes, we only utilized the implant as a normal total hip arthroplasty in function of the length of the stem.

As far as the plate in concerned we preferred to put locking screws instead of cerclages to preserve the periosteum blood supply; the LAP-LCP exhibited significantly higher stiffness and fewer relative movements at the plate–femur interface, indicating better stability. Moreover, the LAP-LCP construct demonstrated a longer time to failure under cyclic loading, suggesting superior biomechanical performance. [5]

Conclusion

Joint replacement may represent a good solution in case of multiple osteosynthesis failures. Good pre-op planning that helps with the choice of the implant, also considering the characteristics of our patient, is the key to minimizing perioperative complications and optimizing functional outcomes.

Conflict of Interest

The authors declare no conflict of interest.

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