Management of a failed femoral plate in an obese patient: A case report

Ren Yi Kow[1], Zamri Ab Rahman[1], Ruben Jaya Kumar[1], Zaharul Azri Mustapha@Zakaria[1], Chooi Leng Low[2]

Abstract

Femoral nailing is the overall "gold standard" in treating femoral shaft fractures. However, plate osteosynthesis at the femoral shaft is still being done in selected patients. We report a case of right femoral implant failure after a broad limited contact dynamic compression plate (LC-DCP) insertion and its subsequent management using our minimally invasive technique. Our technique is biologically compliant as well as cosmetically friendly. We converted a load-bearing implant into a load-sharing implant in view that obesity is a significant predictive factor of non-union in a femoral fracture treated with locking plate. The patient subsequently recovered well with no complication.

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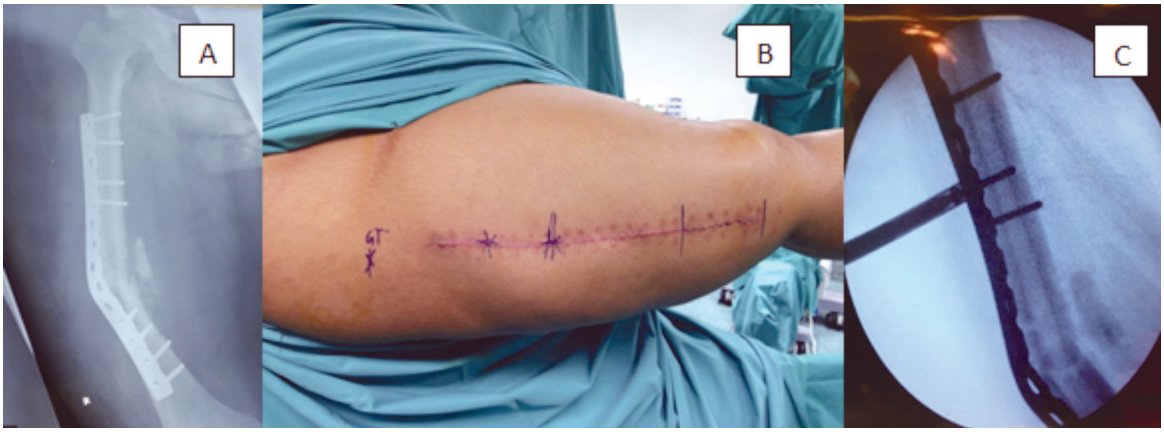
Keywords: Implant failure, intramedullary nail, dynamic compression plate, femur fracture, obesity, minimally invasive.

Introduction

Femoral shaft fractures usually result from high energy trauma. Over the years, femoral nailing is the overall "gold standard" in treating femoral shaft fractures.[1] However, plate osteosynthesis at the femoral shaft is still being done in patients with narrow or locked medullary canal, significant axis deviation of femur, compartment syndrome or paediatric femoral shaft fracture.[1] Here, we report a case of right femoral implant failure after a broad limited contact dynamic compression plate (LC-DCP) insertion and its subsequent management.

Case Report

Miss NH, a 27-year-old Malay lady with a body mass index of 34.4 kg/m^2 but with no other medical illness, presented with pain at her right thigh to our clinic. She was involved in a motor vehicle accident two months ago and sustained a closed fracture of the midshaft of her right femur. She had an open reduction and a limited contact broad dynamic compression plate (LC-DCP) inserted at the centre. Her right lower limb was strictly non-weight bearing for 2 months and there was no recent history of trauma or fall. Radiographs of her right femur showed an implant failure of the right femur. She was afebrile and her septic parameters were normal and her erythrocyte sedimentation rate was 26 mm/hour while her total white blood cell count was 7.3 x 103/uL (Figures 1-A to 1-C).



Figures 1-A to 1-C: Figure 1-A shows the periprosthetic implant fracture at the patient's right femur. Picture 1-B shows the pre-operative preparation of the patient. Figure 1-C shows the technique of proximal screw removal.

[1]Department of Orthopaedic, Hospital Kuala Lipis, 27200 Kuala Lipis, Pahang, MALAYSIA.

[2]Department of Radiology, Hospital Kemaman, 24000 Kemaman, Terengganu, MALAYSIA.

Address for Correspondence:

Dr Kow Ren Yi, Department of Orthopaedic, Hospital Kuala Lipis, 27200 Kuala Lipis, Pahang, MALAYSIA.

Email: renyi_kow@hotmail.com

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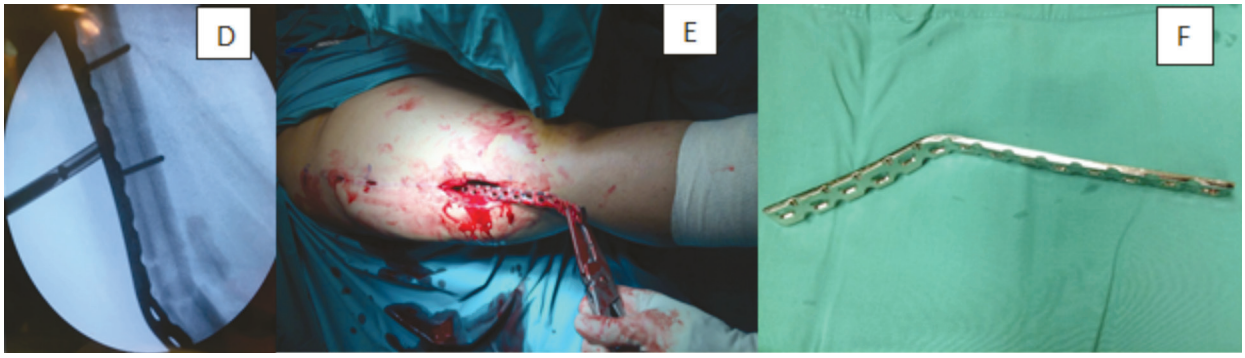
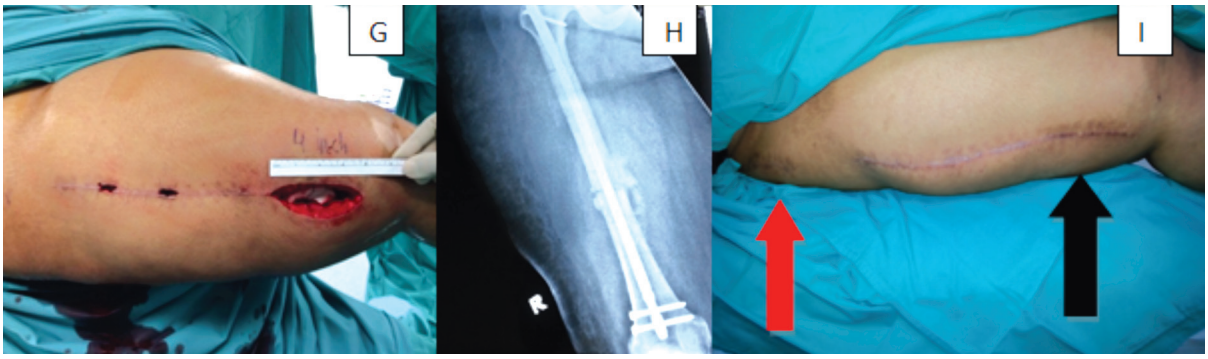
We proceeded to removal of the LC-DCP using a minimally invasive technique. The proximal screws were located with the aid of an image intensifier. An intramedullary nail (IMN) locking sleeve was attached to the head of the proximal screws and the proximal screws were then removed with a 4.5 mm large fragment hexagonal screw driver. An incision was made in between two screws to minimise the number of wounds. A four-inch wound was made on the previous surgical scar at the site of the distal LC-DCP to facilitate the removal of the LC-DCP. Then, we converted from extramedullary to intramedullary fracture fixation by using the greater trochanter portal IMN with the distal screws inserted via the four-inch wound made previously (Figures 1-D to 1-H).

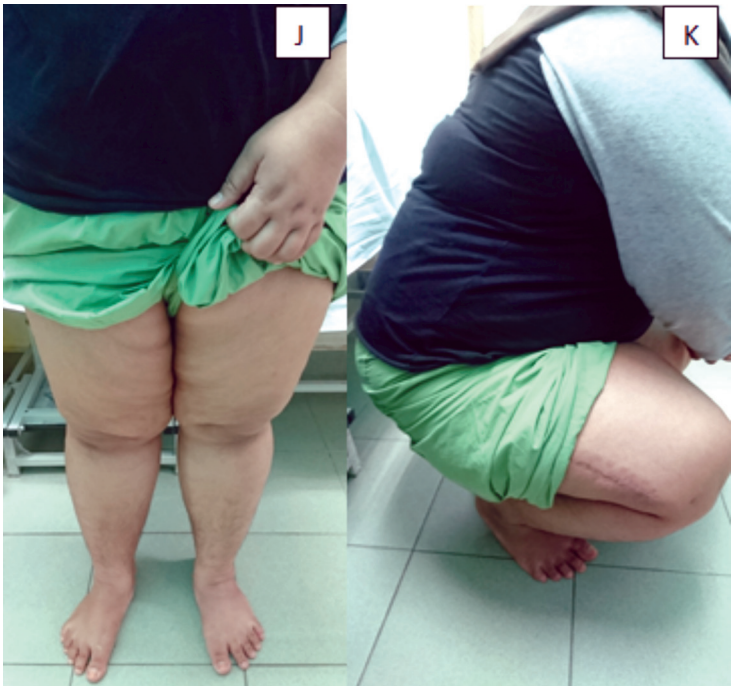


Figures 1-D to 1-H: Figure 1-D shows an intramedullary nail (IMN) locking sleeve was attached to the head of the proximal screws and removed with a 4.5 mm large fragment hexagonal screw driver. Figure 1-E shows the technique of plate removal intra-operatively. Figure 1-F shows the removed bent plate.



Figures 1-G to 1-I: Figure 1-G shows the wound of the patient after removal of the bent plate. Note that only two stab incisions were made to remove the four proximal screws. Figure 1-H shows the post-operative radiograph of the patient's right femur, after an intramedullary nail insertion. Figure 1-I shows the wound of the patient 6 months post-operation. Note that there is only minimal scar formation at the created wound (black arrow) and at the greater trochanter (red arrow).

The patient recovered well and the fracture site healed well with minimal scar formation at the wound (Figure 1I). She was able to start weight bearing ambulation at 3-months post-operatively and ambulated normally at 6-months post-operatively. Her hip and knee range of motion were normal one year after the corrective surgery (Figures 1-J and 1-K).



Figures 1-J and 1-K: Figures 1-J and 1-K show the full range of movement of the affected lower limb at 1 year after surgery.

Discussion

In patients with implant failure of the femur, the conventional technique of implant removal involves incision and opening of the previously created wound. However, the conventional technique is associated with extended soft tissue release at the fracture site with potential disturbance of the vasculature at the fracture site.[1] Our technique demonstrated that it is biologically compliant as well as cosmetically friendly. This technique was modified from the technique reported by Hoffmann et al who used the "push-pull" technique in paediatric patients.[2] By using this method, we managed to avoid a "second-hit" on soft tissues and scar formation besides avoiding the complications of hematoma formation, infection and neurovascular injury. In this patient we made two small incisions to remove four proximal screws with the guidance of an IMN sleeve. The sleeve is important to prevent the screws from dropping back into the soft tissue during the removal especially in an obese patient. We made a distal incision instead of a proximal one because the distal bent plate has a shorter length with a smaller turning radius, enabling us to remove it with a smaller wound.

After the removal of the failed LC-DCP, we decided to insert an intramedullary nail (IMN) due to the fact that obesity (BMI >30kg/m2) is a significant predictive factor of femoral fracture non-union after lateral locked plate.[3] Obesity alone poses a risk of 44% if a stainless steel plate is used.[3] The problem of inserting an intramedullary nail is the technical difficulty encountered intra-operatively particularly in an obese patient. Aneja et al has demonstrated that intramedullary nailing of femur in obese patients is associated with longer operative time as compared to patients with normal weight.[4] The longer operative time is attributed to the difficulty in locating the piriformis fossa as the entry point of the IMN in an obese patient.[4] However, by using a nailing system with a greater trochanter (GT) portal, we managed to avoid an otherwise long operative time. Besides that, antegrade nailing can help avoid complications of post-traumatic knee arthritis, knee stiffness and septic arthritis.[1] By converting the implant from a load-bearing device (DCP) to a load-sharing device (IMN), the patient subsequently recovered without any sequelae.

Conclusion

Management of implant failure of the femur in obese patients is challenging. Via this case report, we managed to highlight the technique of implant removal using a minimally invasive procedure. This technique is useful in removing a bent or a broken plate.

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