

Bipolar Hemiarthroplasty in a Patient with above-knee Amputation: Surgical Technique

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What to Learn from this Article?

A surgical technique that helps you to perform a bipolar hemiarthroplasty in a patient with above-knee amputation with ease.

Abstract

Introduction: Femoral neck fractures are a common occurrence in lower limb amputees. Good post-operative results of hip hemiarthroplasty have been described in below-knee amputees. However, to our knowledge, very few such cases have been reported in above-knee amputees.

Case Report: We present a case of a 75-year-old male patient who underwent above-knee amputation of the right lower limb for severe crush injury right leg and a bipolar hemiarthroplasty for an ipsilateral fracture neck of femur sustained in the same road traffic accident. The treatment of neck of femur fracture in above-knee amputee patients is always a challenge for the orthopedic surgeon. We described the surgical technique in an attempt to overcome the challenges encountered in such a setting.

Conclusion: While performing a hemiarthroplasty in an above-knee amputee, we recommend the use of two perpendicularly placed Schanz pins distally in the subtrochanteric area for control and also as a guide for verifying the version during prosthesis placement.

Keywords: Hemiarthroplasty, above-knee amputee, Schanz pins.

Introduction

Bipolar hemiarthroplasty is a common procedure for femoral neck fractures. Femoral neck fractures are not an uncommon occurrence in lower limb amputees. Many such cases have been reported in below-knee amputees with good post-operative results of hip hemiarthroplasty [1,2,3]. However, to our knowledge, very few such cases have been reported in above-knee amputees [4].

Case Report

A 75-year-old male patient met with an road traffic accident and presented to our emergency department with a major crush injury with Gustilo type 3B open OTA 33.C3 distal femur and Gustilo type 3B open OTA 42.C1.2 both bones leg fracture of right lower limb and with ipsilateral OTA 31.B2.1 of Garden type 3 neck of femur fracture (Fig. 1). On examination, he was drowsy and found to be

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Author's Photo Gallery



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Figure 1: Pre-operative radiograph of 75 years male patient with garden type 3 neck of femur fracture and for whom above-knee amputation was done.

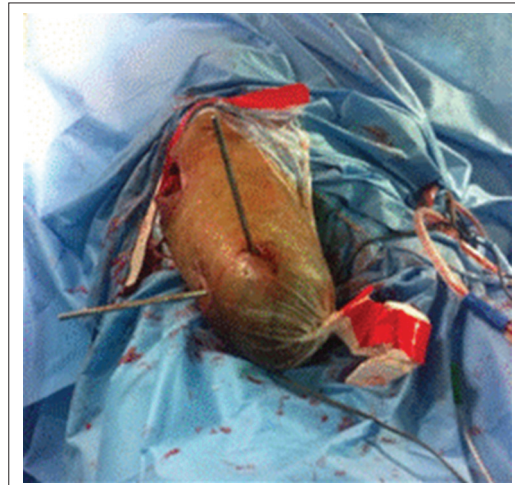


Figure 2: Per-operative picture showing the Schanz pin placement. Two 6.5 mm Schanz pins have been applied perpendicular to each other with one pin in anteroposterior plane and the second pin in sagittal plane just proximal to the amputation stump.

hemodynamically unstable. Initially, his airway was compromised, so to secure the airway, intubation was done and controlled ventilation was given. For circulation, two large IV assess were taken and 2 L of IV fluids to stabilize the blood pressure. Urinary catheterization was done to check the urine output. Damage control surgery was done in the form of debridement and knee spanning external fixator application. Patient was reviewed periodically, and after 48 h in view of inadequate perfusion of right leg, an above-knee amputation was performed. The patient was in intensive care unit under care of the intensivist and neurologist for another 2 weeks in view of disorientation, altered sensorium, and an ill responding electrolyte imbalance. There was no head injury but bilateral parietal infarcts were noted on computed tomography brain. After these 20 days, a thorough multidisciplinary assessment was done and the patient was taken up for surgery. We planned to do cemented bipolar hemiarthroplasty for the neck of femur fracture considering the age of the patient which was 75 years. A cemented bipolar hemiarthroplasty was done with no anesthetic, intraoperative or post-operative complications.

Surgical technique

Under combined spinal epidural anesthesia patient was positioned supine with a sand bag under the ipsilateral buttock. The operative site was draped in the standard manner. Initially, as the first step two 6.5 mm Schanz pins have been applied perpendicular to each other with one pin in anteroposterior plane and the second pin in sagittal plane (Fig. 2 and 3) with an idea that this will aid in traction and also manipulating the femur which is difficult in such cases. We applied the Schanz pins just proximal to the amputation stump as they will not obstruct the stem of the prosthesis. The first Schanz pin was applied from the lateral aspect with the limb in neutral position and perpendicular to the bone under c-arm guidance. The second Schanz pin was applied in the anteroposterior plane perpendicular to the first Schanz pin. The hip was approached by the standard lateral approach. After exposing the fracture site, neck cut was performed and head delivered. The canal was rasped and in view of a wider canal cementing was done and bipolar prosthesis inserted. There was no restriction of

the length of the prosthesis as the length of the amputation stump was adequate. The prosthesis was inserted 10° anterior to the sagittal Schanz pin to maintain the version. Traction and internal rotation was applied using the Schanz pins and the joint relocated. Position was verified on fluoroscopy (Fig. 4 and 5) and intraoperative stability confirmed. The Schanz pins were removed. The wound was closed in layers over a vacuum suction drain and a separate dressing was done for the surgical site and amputation stump.

During the immediate post-operative period, the patient was clinically stable without any complication. Physiotherapy with isometric exercises was started after 48 h, and the patient was mobilized with the help of walker after 4 days. The patient was discharged on 7th post-operative day and was again reviewed 10 days later for suture removal. The patient began to walk full weight bearing walking with above-knee prosthesis with walker support at 6 weeks. He began to walk without any support with above-knee prosthesis at 10 weeks. Now at 14 months, the patient is comfortable, pain-free and walking full weight bearing without any support (Fig. 6).

Discussion

Very few cases of hemiarthroplasty for fracture neck of femur in above-knee amputees have been reported in the literature [4]. Till date, no case has been reported in the acute trauma setting. When a decision to perform hemiarthroplasty has been made these patients require special care and follow-up. There are also some peculiarities and challenges faced during the surgical technique. Pre-operative planning included radiographs including the entire stump to assess the remaining femoral length with the intention of being able to ensure an adequate place for stem placement. In our case, the stump length was adequate.

During the procedure, major difficulties faced are related to manipulation and handling of the femur [5] and also ensuring a proper implant positioning. Lack of an adequate distal fragment

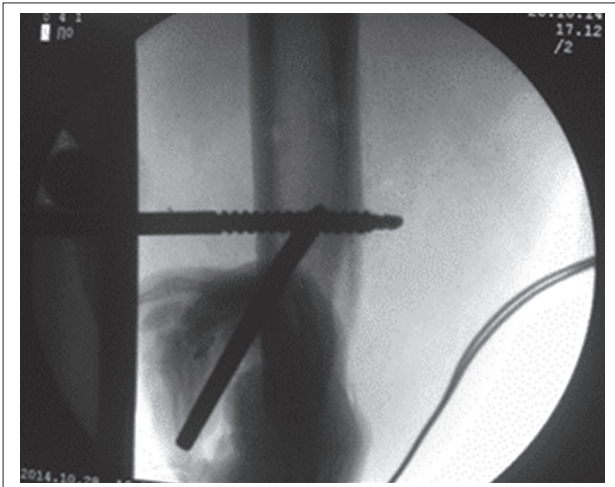


Figure 3: Fluoroscopic images showing the pin placement.

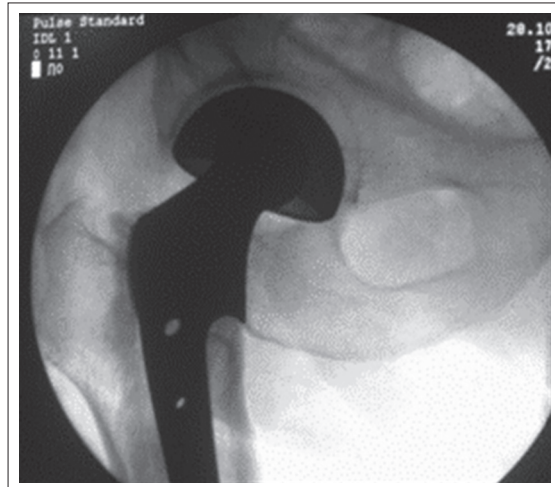


Figure 4: Fluoroscopic images showing proper placement of the prosthesis.

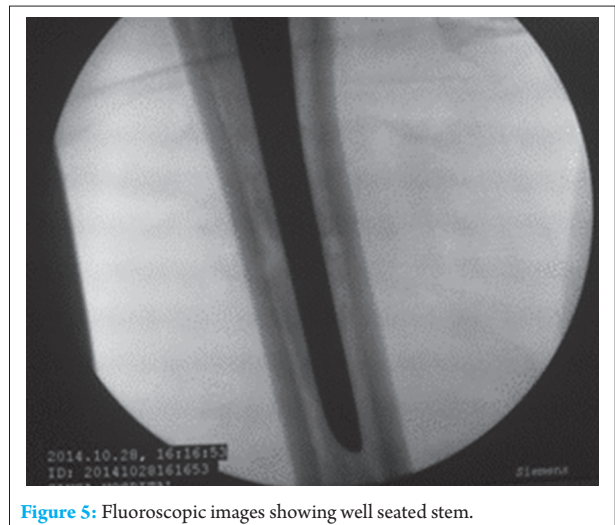


Figure 5: Fluoroscopic images showing well seated stem.



Figure 6: One-year follow-up radiograph.

makes it difficult to get a good lever arm and hence providing traction and relocating the joint becomes difficult. Standard references like knee and leg position and axis are also lacking in these patients and hence adjusting version and assessing implant position also becomes difficult.

Previous authors who reported such similar cases advocate the use of a bone clamp placed in the subtrochanteric area [5] which can be used to manipulate the femur and also provides rotational orientation. To place the clamp, we may need at times to extend the soft tissue dissection and also when applied in a severely osteopenic bone [6] this may even crush the bone when the clamp is tightened or may frequently disengage.

Unlike the previous authors, we have used a simple technique of inserting two 6.5 mm Schanz pins in two perpendicular planes with one in the anteroposterior plane and other in the mediolateral plane above the distal end of the stump to address the problems faced while using reduction clamps. These pins could be placed percutaneously without any additional opening. These pins could be placed at a comfortable distance away from the operative field and when an assistant handles these pins for

traction and manipulation of the femur it is well away from the operating field and does not obstruct the field. These pins also provide an excellent reference for rotational orientation owing to their simple design. When assessing for correct version, assessing against an instrument like Schanz pin will be more simple and accurate than against a clamp. The assessment becomes even more accurate as there will be pins in two perpendicular planes. These Schanz pins can be placed without any problem in the osteopenic bone as well. It is for these reasons that we recommend the use of 2 perpendicularly placed Schanz pins rather than a bone clamp to manipulate the femur.

Post-operative rehabilitation and an expert orthotist are also essential for the better outcome in such patients. A regime focused on strengthening hip flexors, and knee extensors are essential to prevent contractures. Our patient was started on physiotherapy 48 h after the surgery and now at 14 months follow-up he is walking full weight bearing without any support. In this patient, we feel that we have prevented functional deterioration and given him a functionally useful mobilization.

Our main aim in presenting this case was to emphasize on the surgical technique especially on handling the femur during surgery. We recommend the use of two perpendicularly placed Schanz pins distally rather than a bone clamp in the subtrochanteric area for this purpose.

Conclusion

While performing a hemiarthroplasty in an above-knee amputee, we recommend the use of two perpendicularly placed Schanz pins distally in

the femur for control and also as a guide for verifying the version during prosthesis placement.

Clinical Message

The treatment of neck of femur fracture in above-knee amputee patients is always a challenge for the orthopedic surgeon. With this surgical technique, manipulation of the stump, providing traction, and maintaining version will be easy.

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