

Hip dislocation and femoral component disassembly after bipolar hemiarthroplasty: a report of four cases and introduction of new reduction maneuvers

Yan-Yan Bian, Long-Chao Wang, Ke Xiao, Jin Jin, Bao-Zhong Zhang, Xi-Sheng Weng

Department of Orthopaedic Surgery, Peking Union Medical College Hospital, Peking Union Medical College, Chinese Academy of Medical Science, Beijing 100730, China.

To the Editor: Bipolar hemiarthroplasty is one of the treatment options for unstable femoral neck fracture in the elderly. Hip dislocation after hip replacement is a common complication but dissociation of a bipolar prosthesis is rare and more serious complication, which always requires open reduction and revision. Some authors have reported dissociation after bipolar hemiarthroplasty of the hip. The present study reported four cases of disassembly after the primary bipolar hemiarthroplasty due to different causes and explained the mechanism. It will be beneficial for surgeons who encounter the same situation.

Case 1: A 79-year-old woman underwent bipolar hemiarthroplasty (Smith&Nephew, Switzerland) after a subcapital fracture of the left femur. Two days later, while attempting to change her position in bed, she was struck by sudden pain and unable to move. On examination, her left lower limb was shortened and internally rotated, raising the suspicion of hip dislocation. X-ray showed a displaced femoral head [Figure 1A]. The patient was sent to the operation room (OR) for close reduction under general anesthesia. During routine maneuvers, the polyethylene cup accidentally dislodged from the small head of the prosthesis. The cup fell out of the acetabulum and the small head fell in [Figure 1B]. As a consequence, surgery was performed to re-assemble the components and correct the dislocation [Table 1].

Case 2: A 92-year-old woman underwent bipolar hemiarthroplasty under spinal anesthesia for a subcapital fracture of her right femur a month ago. Nine days after the surgery the patient fell off from her bed and sustained a posterior dislocation of the prosthesis. X-ray showed a displaced femoral head. The patient was sent to the OR for close reduction under general anesthesia. During the maneuvers, disassembly accidentally occurred. The cup was dislodged and lying above while the small head fell into the

acetabulum. Open reduction was performed as a result. Intraoperatively, the prosthesis was found intact and the locking mechanism functioned well. The head components were put back into place. After the reduction operation, the patient was given an orthopedic cast for immobilization of the lower limb for 4 weeks.

Case 3: An 85-year-old woman presented to our emergency department with right-sided hip pain after a fall. X-ray identified a transcervical fracture of the femur. Bipolar hemiarthroplasty was performed under general anesthesia. Six days later, she suffered a sudden pain and could not move the lower limb while changing the position in bed. Plain film radiographs showed a posterior dislocation. Close reduction was performed under general anesthesia and the patient was discharged after a week. Four weeks after discharge, she had hip dislocation again while in an attempt to sit up from a chair. When close reduction was performed, the polyethylene cup and the prosthetic head dissociated. The patient was taken to the OR where she underwent revision hemiarthroplasty. Intraoperatively we found that the external rotators were torn, and the femoral head components were disassembled and extruding through the repaired capsule and the abductor. No evidence of fractures of the acetabulum was observed, and the femoral components remained well fixed. The femoral head was substituted by the one with a longer neck (from 0 mm–8 mm) in order to obtain stronger soft tissue tension. The hip was reduced and its stability confirmed.

Case 4: A 76-year-old man underwent bipolar hemiarthroplasty after a subcapital fracture of his left femur. Four weeks later, he suffered sustained pain and could not move his left leg after falling down on the floor. X-ray showed dislocation of the femoral head [Figure 1C]. Patient was taken to the OR for close reduction under general anesthesia. Before routine maneuvers of reduction,

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Correspondence to: Dr. Bao-Zhong Zhang, Department of Orthopaedic Surgery, Peking Union Medical College Hospital, Peking Union Medical College, Chinese Academy of Medical Science, Beijing 100730, China
E-Mail: zbz9639@sina.com

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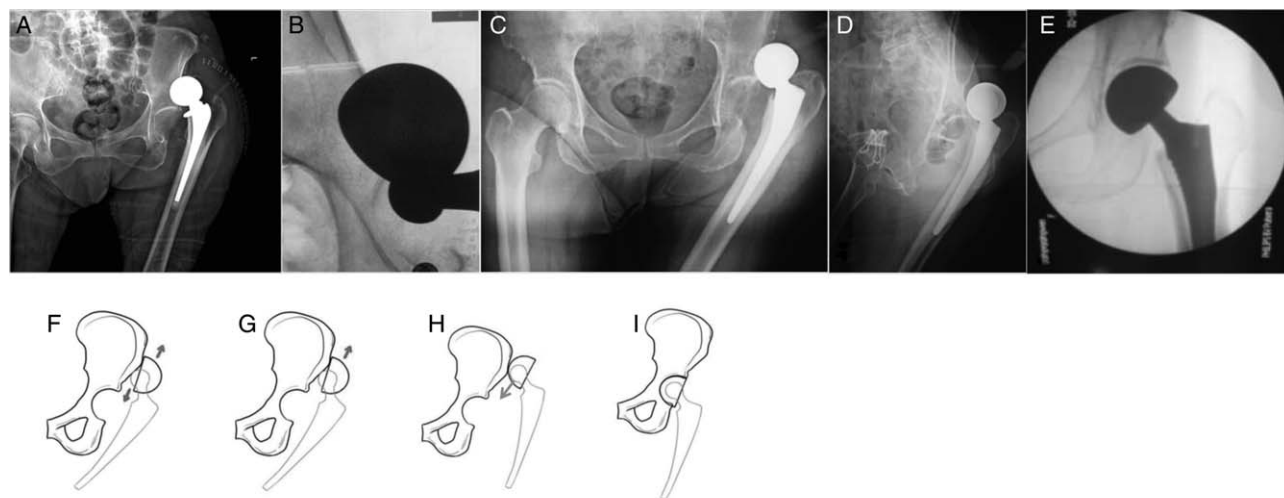


Figure 1: Typical manifestations of dislocation and dissociation of bipolar hemiarthroplasty and a schematic diagram of new reduction manoeuvres. (A) Roentgenograph showing dislocation after bipolar hemiarthroplasty of case 1. (B) X-ray after manoeuvres of reduction. Dissociation between the polyethylene cup and ball head. The cup was separated and lying above the acetabulum while the small head fell inside. (C) X-ray showing dislocation after bipolar hemiarthroplasty. (D) X-ray showing the outer bipolar shell locked behind the acetabular rim, with the clip as a marker in the front. (E) X-ray showing successful close reduction by push-turnover-pull manipulation under general anesthesia. (F) Diagrammatic sketch showing the so-called “bottle-opener mechanism”. (G) Diagrammatic sketch showing reduction of the affected limb toward the proximal part. (H) Graph showing turn the outer cup over on the acetabulum by the effect of leverage. (I) Successful routine close reduction of the dislocation.

Table 1: Characteristics and treatment of patient with hip dislocation and femoral component disassembly after bipolar hemiarthroplasty

Patient no.	Sex	Age (years)	Fracture type	Prosthesis brand	Time after surgery	Injury cause	Injury type	Treatment
1	F	79	Subcapital Left Femur	Smith&nephew	2 days	Mobilizing on the bed	Posterior-up dislocation of the acetabulum	During manipulation under general anesthesia, dissociation of the head components occurred, with polyethylene cup falling out of the acetabulum. Open reduction and reassemble the components
2	F	92	Subcapital Right Femur	Smith&nephew	9 days	Falling off from the bed	Posterior dislocation of the acetabulum	During manipulation under general anesthesia, dissociation of the head components occurred, with polyethylene cup falling out of the acetabulum. Open reduction and reassemble the components.
3	F	85	Transcervical Right Femur	Smith&nephew	6 weeks	Sitting up from chair	Posterior dislocation of the acetabulum	During manipulation under general anesthesia, dissociation of the head components occurred, with polyethylene cup out of the acetabulum. Open reduction and change to the longer neck (0 mm to 8 mm)
4	M	76	Transcervical Left Femur	Smith&nephew	4 weeks	Falling down	Posterior dislocation of the acetabulum	Push-turnover-pull manipulation under fluoroscopic supervision under general anesthesia. Close reduction successful.

F: Female; M: Male.

we found that the outer bipolar shell was locked behind the acetabular rim [Figure 1D]. We therefore push the affected limb proximally and to turn the outer cup over on the acetabulum by internally rotated and adducted the leg, then routine close reduction of the dislocation [Figure 1E].

Hemiarthroplasty of the hip is a common treatment option in the elderly with femoral neck fractures.^[1] It gains advantages over total hip arthroplasty for its simpler procedures, less surgical trauma, and quicker postoperative recovery. Bipolar prosthesis brings satisfactory early and long-term outcomes and is recognized as having comparative, if not better, designs than that of unipolar ones.^[2-4] Incidence of dislocation after hemiarthroplasty is low^[5,6] and is not significantly different between unipolar and bipolar hip hemiarthroplasty.^[7,8] But dissociation of femoral head components is a rare complication with bipolar prosthesis, in which case disassembly occurs between the polyethylene cup and the prosthetic head.^[9,10]

Disassembly after bipolar hemiarthroplasty can occur for many reasons. In most of the cases, disassembly of the polyethylene cup and the inner femoral head occurs after manipulation for closed reduction under general anesthesia. When this happens, the outer bipolar shell can be locked along the acetabular rim, which requires the surgeon to apply traction force to reduce the dislocated hip, dissociation would occur while the inner head continued to be pulled. The mechanism was called “bottle-opener mechanism” [Figure 1F]. In the present cases, dissociation all happened during manipulation under general anesthesia, with polyethylene cup falling out of the acetabulum while the small head falling inside.

To approach such situations, proximal translation of the affected limb and adduction under fluoroscopic supervision is recommended [Figure 1G], in order to turn the outer cup over on the acetabulum by the effect of leverage [Figure 1H]. That makes the convex of the femoral head rather than the edge in contact with the acetabular bone. Then routine close reduction of the dislocation could follow [Figure 1I].

Excessive wear of polyethylene liner and failure of the locking ring mechanism can also contribute to dissociation. Under this circumstance, the bipolar shell usually still lies in the acetabulum with the inner head falling out of the acetabulum.

Dissociation as an iatrogenic complication warrants caution. Once closed reduction fails, open reduction has to be performed. Locking mechanism must be inspected and the short external rotator muscle should be repaired. Proper soft tissue tension should be maintained, and if necessary, by increasing the length of the neck (offset) to help maintain stability.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given

their consent for their images and other clinical information to be reported in the journal. The patients understand that their name and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflicts of interest

None.

Author contributions

Bian YY: Preparation of case report, literature review, and writing the paper; Xiao K: Collecting the data; Weng XS: Providing ideas, giving recommendations, and reviewing the paper; Jin J and Wang LC: Providing clinical data; Zhang BZ: Providing clinical data and reviewing the paper.

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