CASE REPORT
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Reduction of the Femoral Head First, and Assembly of the MUTARS® Device in Case of Impossible Reduction during Total Hip Arthroplasty

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Dislocation after a total hip arthroplasty occurs in approximately 1% of patients; however, the frequency is much higher after revision surgery. To prevent dislocation, use of a larger femoral head is recommended, and a dual mobility femoral head has been introduced. However, reducing the dual mobility femoral head to the acetabular component is difficult in cases involving contracture in the soft tissue around the joint. A 72-year-old male patient who developed a periprosthetic joint infection underwent two-stage revision surgery using MUTARS®. Two months after the revision, the hip joint became dislocated and manual reduction was attempted; however, dislocation occurred again. During another revision using a dual mobility bearing, the soft tissue around the hip joint was too tight to reduce. The problem was overcome by first repositioning the dual mobility head into the acetabular socket, followed by assembly of the diaphyseal portion of the implant.

Key Words: Arthroplasty, Hip prosthesis, Joint instability, Reoperation

The frequency of dislocation after primary hip arthroplasty is approximately 1%; however, it can be as high as 39% in cases involving revision surgery[1,2]. Although various methods have been used to prevent dislocation, a simple method that can be applied during performance of surgery is to increase the jump distance using the largest possible head[3]. The use of dual mobility bearing is a suitable method for achieving this goal[4]. However, reducing the dual mobility femoral head to the acetabular component is difficult in the case of contracture in the soft tissue around the joint[4,5]. Jump distance refers to the amount of lateral movement of the femoral head center needed to cause its dislocation from the acetabular cup. The larger the jump distance, the lower the risk of dislocation. Dual mobility bearings are designed to provide the arthroplasty construct with a higher jump distance in order to increase hip stability[6].

Periprosthetic fracture of the femur, Vancouver type B3 is an indication of tumor prosthesis resulting from severe bone loss around the prosthesis[7]. In this case, the Modular Universal Tumor and Revision System (MUTARS®; Implantcast GmbH) was used by the author in performance of revi-

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sion. According to the design of this insert, the diaphyseal component can be separated into two parts and fastened with side screws. Because only two metal protrusions must be overcome for its assembly, when there is a large jump distance and reduction is not possible, it is thought that repositioning of the head to the acetabular socket and assembly of the diaphyseal component will result in an easier reduction.

CASE REPORT

A 72-year-old male patient who had undergone total hip arthroplasty for management of osteoarthritis of the left hip 12 years ago developed a periprosthetic fracture (Vancouver type B3) of the femur and underwent revision surgery using MUTARS®. Three years later, after development of periprosthetic joint infection, two-stage revision was performed. Two months after the last revision surgery, dislocation of the prosthetic joint occurred. A manual reduction was performed; however, one month later, dislocation of the joint occurred again (Fig. 1). In preparation for revision surgery, computed tomography was performed to determine whether the implant was malpositioned. The position of the acetabular cup was 40˚ inclination and 15˚ anteversion, and the

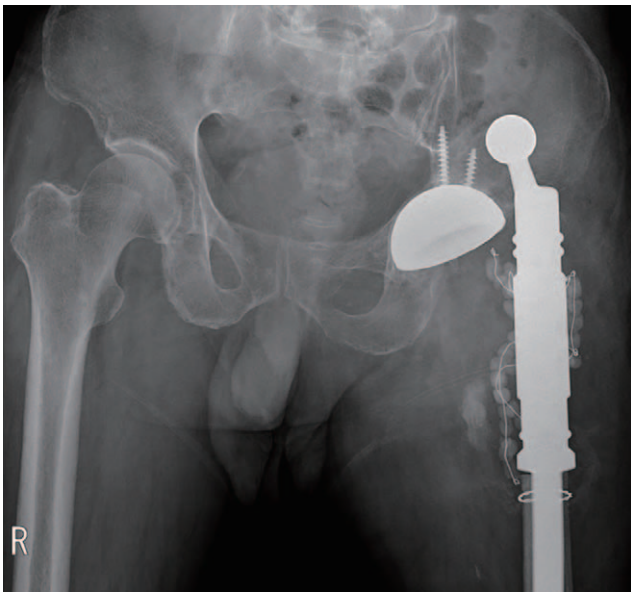

Fig. 1. Revision arthroplasty was performed using MUTARS® and dislocation occurred.

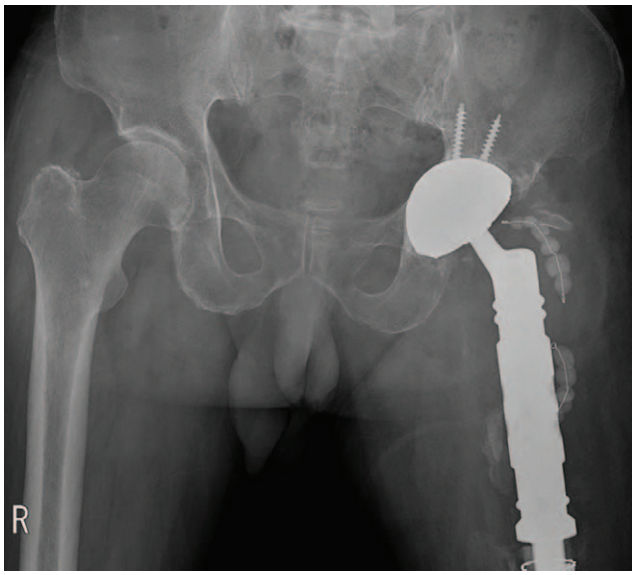

Fig. 2. Acetabular cup and femoral head were changed using a dual mobility bearing.

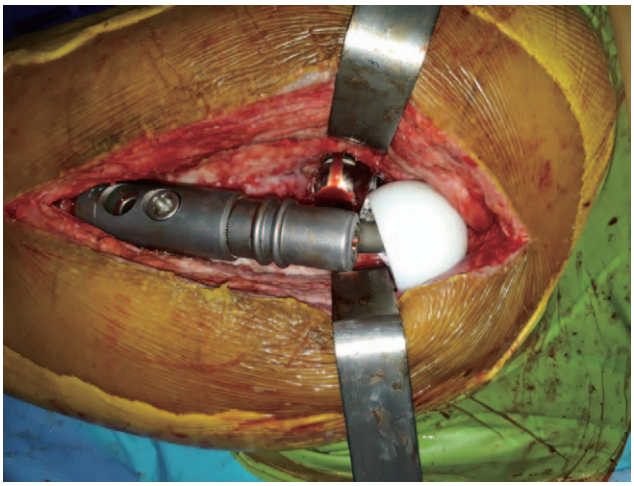

Fig. 3. Reduction was impossible after installing a dual mobility head.

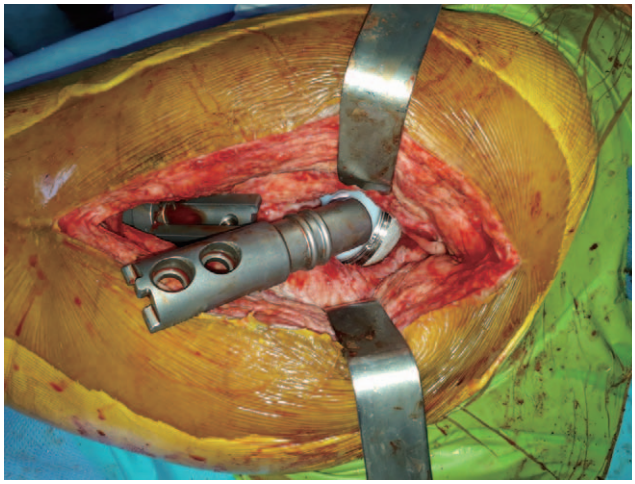

Fig. 4. The assembly of MUTARS® was disintegrated and the head was reduced into the acetabular shell.

anteversion of the femoral stem was 20˚, indicating optimal combined anteversion and good positioning of the implant. The authors attempted to find a suitable implant with the largest possible size for replacement of the femoral head in order to increase the jump distance and improve hip stability. However, the current acetabular cup was limited to a 28-mm head. Therefore, a revision including acetabular cup was planned and revision was performed using a dual mobility femoral head, which offers the greatest advantage in preventing dislocation (Fig. 2). During surgery, the soft tissue around the hip joint was tight and reducing the femoral head to the acetabular component was not possible (Fig. 3). A successful reduction was achieved by first repositioning the femoral head and then assembling the diaphyseal portion of the implant (Fig. 4, 5). During the two-year follow-up period, there was no occurrence of dislocation, and the patient was able to ambulate using a cane, with clinically favorable results. The modified Harris hip score was 69 and the HOOS, JR (hip disability and osteoarthritis outcome score, joint replacement) score was 73.472.

Written informed consent was obtained from the patient for publication of this case report and the accompanying images.

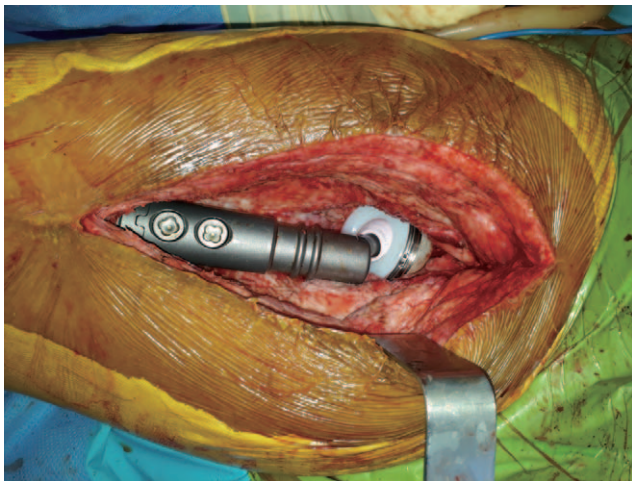

Fig. 5. Diaphyseal components of MUTARS® were assembled to complete the reduction.

DISCUSSION

The reported risk of dislocation after revision is significantly higher compared with that for primary arthroplasty. This may be related to weakening of the surrounding soft tissues, muscle imbalances, or the possibility of poorly positioned implants; however, determining specific causes may be difficult[1]. In this case, it was assumed that dislocation occurred as a result of weakening of the abductor muscle caused by bone loss in the proximal femur. However, severe soft tissue contracture was observed during surgery,

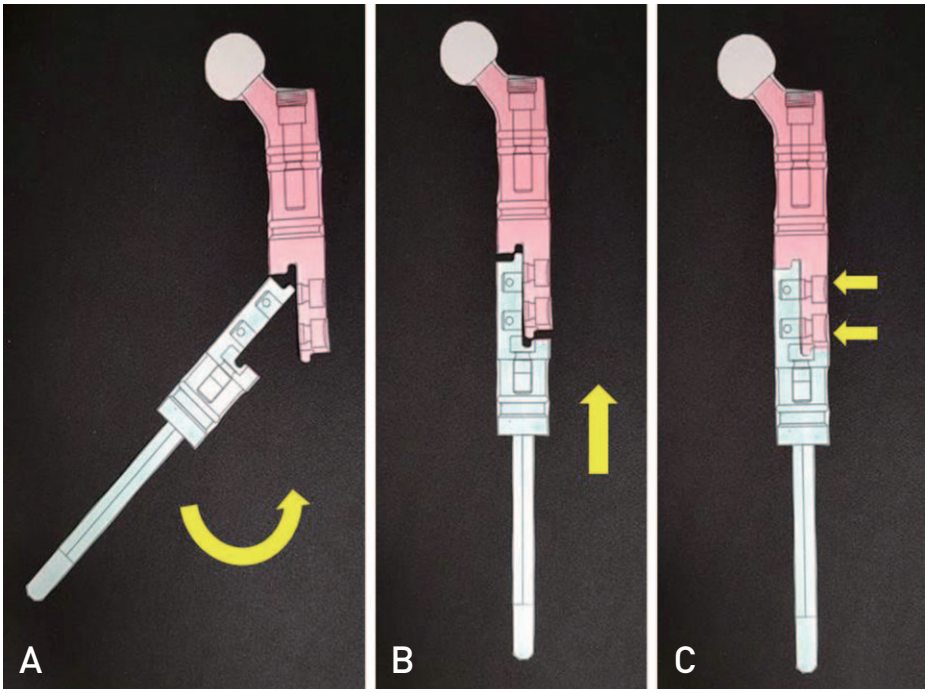

Fig. 6. Sequence of the assembly of the stem. (**A**) Connect the two diaphyseal components, and the thigh is then abducted by the assistant. (**B**) Push the thigh to reduce the gap between the components. (**C**) Tighten the side screws.

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and the prosthetic bearing could not be reduced after completely assembling the femoral components. Randelli et al.[4] suggested the following method for reducing the dual mobility head when it cannot be done directly: first, reduce the head to the acetabular shell, and then connect the trunnion of the femoral stem with the head by pulling the leg sufficiently. In this case, we used MUTARS®, which enabled separation of the diaphyseal component of the femoral stem. The proximal part of the diaphyseal component was combined with the head, the head was reduced into the acetabular shell, and the diaphyseal components were then connected. The problem was solved by first repositioning the femoral head and then assembling the diaphyseal part of the implant (Fig. 6). Use of a large-diameter head, such as a dual mobility bearing, can increase the jump distance, thereby reducing the risk of dislocation[6]; however, it can also pose difficulties during reduction. Soft tissue contracture may be observed in joints that have undergone multiple surgeries; in such cases strong force is required to reduce the joint, which can increase the risk of complications such as intraoperative periprosthetic fractures. Therefore, we believe that complications can be reduced with use of less force when manipulating the joint as in this case. During assembly of the component, support from assistants is required and the degree of the abduction and traction power must be matched. Use of this technique is limited in that a diaphyseal connecting block can only be used if the implant is long enough, thus cautious application is required before and during surgery. In conclusion, using a dual mobility bearing is a practical option for treatment of dislocation after revision hip arthroplasty. However, careful planning of surgery, with consideration of the potential for difficulty in performance of hip joint reduction in cases where the soft tissue is tight is important. Although the method introduced by the authors can be applied in limited situations, it is thought to be extremely useful in cases where reduction has not been achieved due to the inability to overcome soft tissue tension while using the MUTARS® device.

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CONFLICT OF INTEREST

No other potential conflict of interest relevant to this article was reported.

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