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Surgical technique

A simple technique to remove well-fixed acetabular components in revision of total hip arthroplasty

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ABSTRACT

Removing well-fixed acetabular components can be a challenge for orthopaedic surgeons in revision of total hip arthroplasty. Acetabular bone loss, fracture, and other complications occurred in extracting implants may result in instability and fail of revision. Thus, instruments are developed to avoid such complications. We report a simple technique by drilling a tunnel on the superolateral quadrant of acetabulum and using an offset staff to remove acetabular components without many matching units. The procedure of removing well-fixed acetabular components is a simple, efficient, inexpensive, bone stock preserving technique.

Introduction

Removing well-fixed acetabular components, occurring for reasons such as infection, recurrent dislocation, polyethylene wear, and bony impingement, can be a challenge for orthopaedic surgeons in revision of total hip arthroplasty. The purpose of revision is reconstructing form and function of hip joints. Acetabular bone loss and compromised reimplantation often occur in removing procedure of acetabular components. Several bone conservative techniques have been described to reduce difficulties of the operation [1-4]. Based on development and diversity of implant components, a simple and efficient technique for extracting implants is necessary.

Many instruments have been documented to extract acetabular components in bone stock of the acetabulum. Some instruments need curved blades and screws to break bone-cup interface and extract acetabular components. We describe an instrument by designing an offset staff without needing of matching any size of cups. This is a simple, efficient, inexpensive, bone stock preserving technique.

Surgical technique

The acetabular component should be exposed circumferentially before the process of extracting implants. The polyethylene acetabular liner can be firmly screwed and removed by cork-screws [5] or other tools. The detail of the acetabular metal cup is clearly exposed after removing the liner. Based on that, a short tunnel or hole is drilled until reaching the bone-cup interface by a globular burr on the posterosuperior quadrant of the acetabulum. The offset staff with matching diameter is pushed against the metal cup surface through the tunnel. The staff should be perpendicular to the cup before punching it with a hammer to extract. Punch the staff to extract the metal cup, and the bone tunnel can stabilize and guide it without shaking and jumping. Then, a new acetabular component can be implanted stably in adequate technical conditions (Figs. 1 and 2).

Discussion

The concept of blowing screws or staffs by a hammer is not a new one, which has been used as a technique in removing polyethylene components in revision of hip arthroplasty [6]. It can also be used to remove metal cups in infections, recurrent dislocations, malpositions, and polyethylene component wear. In some cases, infections in bone-cup interface make acetabular components removing easily, because of bone stock reducing and components loosening. But removing stable acetabular components can be challenging, inefficient, and reducing bone stock [7]. The main

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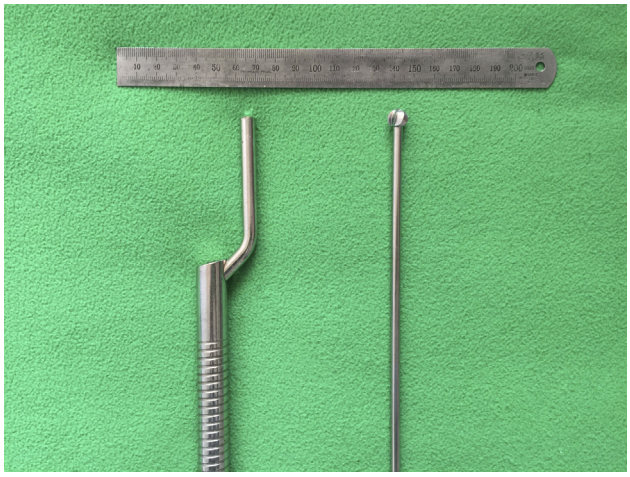

Figure 1. The burr and the offset staff are used to create a tunnel in the acetabulum and extract acetabular components with a hammer.

concern regarding revision is acetabular bone loss during extracting well-fixed acetabular components, which may occur as a factor of the primary procedure or revision itself [8]

Some instruments need the diameter of metallic femoral heads matching with the inner diameter of cups or polyethylene components. Although the diameters are matching, bone ingrowth in bone-cup interface prevents curved blades to cut in and screw. Cutting with blades can take off bone stock and result in significant bony deficiency of the acetabulum. Even worse, the metal cup cannot be removed after cutting and screwing because the top area of the cup is left with short blades. The instrument we described here has been used in our department for patients successfully. This instrument does not need the diameter of metallic femoral heads matching with the inner diameter of cups or polyethylene components. Acetabular components can be removed efficiently under direct vision with minimal bone loss, no fracture by removing metal cups with the offset staff. Although if the removal process failed, it is possible to loosen bone-cup interface, which is easier to cut in and extract acetabular components with curved blades or other tools.

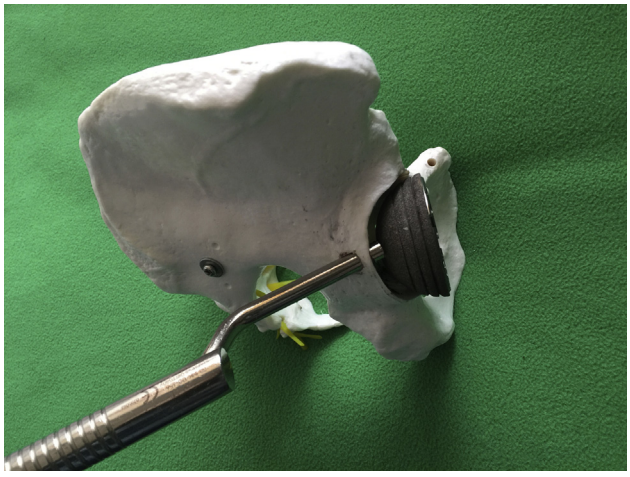

Figure 2. Push the offset staff against the metal cup surface through the tunnel; punch it to extract the acetabular component with a hammer. Only a small bone tunnel is left in the posterosuperior quadrant of the acetabulum.

The tunnel should be drilled on the posterosuperior quadrant of acetabulum, from bone cortex to the surface of acetabular metal cups. Avoid using a burr with unmatched diameters, either a narrow tunnel will block the staff to push in, or a wide one will make it shaking. A bigger diameter tunnel will create an unnecessary space between the bone tunnel and staff, which makes the staff shaking and difficult to be controlled. Power transmitted by the offset staff to metal cups is weakened. And the result is margin fracture, compression holes, or potentially removing medial bone stock. Therefore, it is important to have a clear view of the acetabulum to locate an appropriate drilling point and control the staff direction before punching with a hammer, which will make the process of extracting acetabular components quickly. We recommend a burr with 1 cm diameter to facilitate the process without weakening anterior or posterior column of the acetabulum.

The offset staff and globular metal burr can be added to a standard instrument in orthopaedic surgery simply. Great manual control is obtained without cutting or screwing blades in bone-cup interface, and the bone-cup bond can be disrupted efficiently. With efficient removing of acetabular components, the bone stock is preserved and risks of other complications are minimized. Then, new acetabular components can be implanted stably in adequate technical conditions.

In our experience, this technique could be unnecessary or contraindicate in patients of types of acetabular bone loss, such as aseptic loosening, infection. In these cases of revision, poor bone-cup bond and bone ingrowth, acetabular components are unstable and easy to be extracted. Except for Paprosky grades II, acetabular components fallen and stuck into acetabulum can be extracted by this technique.

Summary

Removing well-fixed acetabular or femoral components is difficult in revision of total hip arthroplasty. The procedure we described here to remove well-fixed acetabular components is a simple, efficient, inexpensive, and bone stock preserving technique. Although if acetabular components failing to be extracted, the technique makes bone-cup interface loosening, and easier to extract acetabular components with other techniques.

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