

Technical Note

A Simple and Reliable Technique for Placing the Femoral Neck Guide Pin in Hip Resurfacing Arthroplasty

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Abstract: Early failure of hip resurfacing has been attributed to component malposition and other factors. Accurate placement of the femoral guide pin is challenging with commercial guides, and computer navigation adds considerable cost to the procedure. Precise pin placement can be achieved by drilling a 2.8-mm pin across the hip joint in a retrograde fashion similar to placing a dynamic hip screw pin. After hip exposure and dislocation, the femoral guide pin can be advanced using the predrilled tract and then used for femoral head preparation. **Keywords:** hip resurfacing, component malposition, femoral guide pin.

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Hip resurfacing is becoming increasingly popular, and the midterm results have been favorable in well-selected patients [1]. The position of the femoral component has been of particular interest, and ensuring the center-center or mild valgus position of the femoral stem within the femoral neck is a chief concern during the procedure. There have been multiple studies that suggest an increase in the incidence of component failure when the components are malpositioned [2-4].

Many of the implant companies provide an aiming guide to assist with the placement of the femoral guide pin; but most of these devices are cumbersome, difficult to use, and sometimes inaccurate. Computer navigation may be used for accurate pin placement, but this adjunct adds to the cost of the procedure [5,6].

To address these concerns for femoral pin placement, we have developed a simple and reliable technique of placing the femoral pin using fluoroscopic assistance and a 2.8-mm terminally threaded pin placed in a retrograde fashion, similar to placing the guide pin for a dynamic hip screw. This retrograde pin creates a hole in the femoral head through which the actual pin for head preparation

can be threaded once the exposure and hip dislocation are complete.

Technique

Positioning

The patient is placed in the lateral decubitus position on a standard operating table with the table pedestal placed close to the patient's head to allow for cranial clearance of the fluoroscopic C-arm (Fig. 1). The patient's operative leg is prepared in the standard fashion for hip arthroplasty using the posterior approach, and the C-arm is draped into the field.

Retrograde Pin Placement

Once the preparation and draping are complete, a small stab wound is made on the lateral thigh at the approximate level of the lesser trochanter, as determined from preoperative templating. Using fluoroscopic guidance, a 2.8-mm terminally threaded guide pin is driven through the lateral cortex and into the center of the femoral neck in both coronal and sagittal planes in a slightly valgus orientation. The pin position is verified on anteroposterior and lateral orthogonal views (Fig. 2). The pin is advanced through the head and across the joint until the tip of the pin comes in contact with the acetabulum. The pin is then removed and the standard posterior exposure of the hip joint is performed.

Hip Exposure and Antegrade Guide Pin Placement

The hip is dislocated, and the femoral head is brought into the wound for preparation. The head is inspected and the pin tract hole is localized. This represents the exit

From the Steadman Hawkins Clinic and Steadman Hawkins Research Foundation, Vail, Colorado.

Submitted April 21, 2009; accepted December 10, 2009.

No benefits of funds were received in support of the study.

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0883-5403/2505-0027\$36.00/0

doi:10.1016/j.arth.2009.12.012

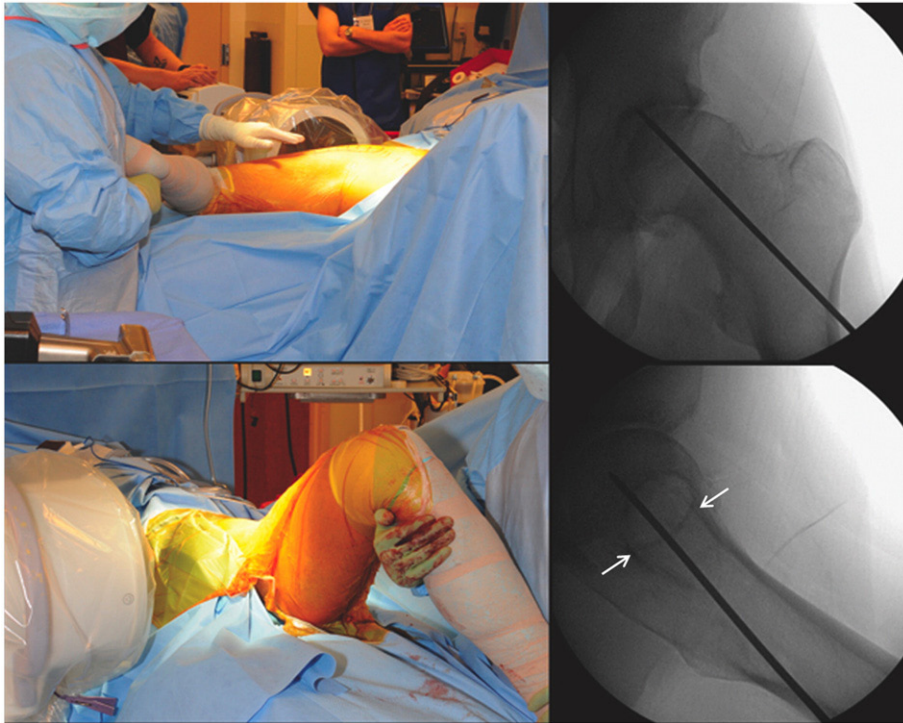


Fig. 1. Fluoroscopic pin placement. Top, The anteroposterior position is assessed. The leg is brought into slight internal rotation to orient the femoral neck version perpendicular to the x-ray beam. The pin, also oriented perpendicular to the x-ray, is then driven in through a small lateral incision into the center of the femoral neck in slight varus. Bottom, By externally rotating the femur, a frog-leg lateral view can easily be obtained; and the position of the pin can be visualized. Pin in the desired position (the arrows depict the anterior and posterior cortices of the femoral neck). The goal is the center-center position of the neck and slight valgus on the coronal view.

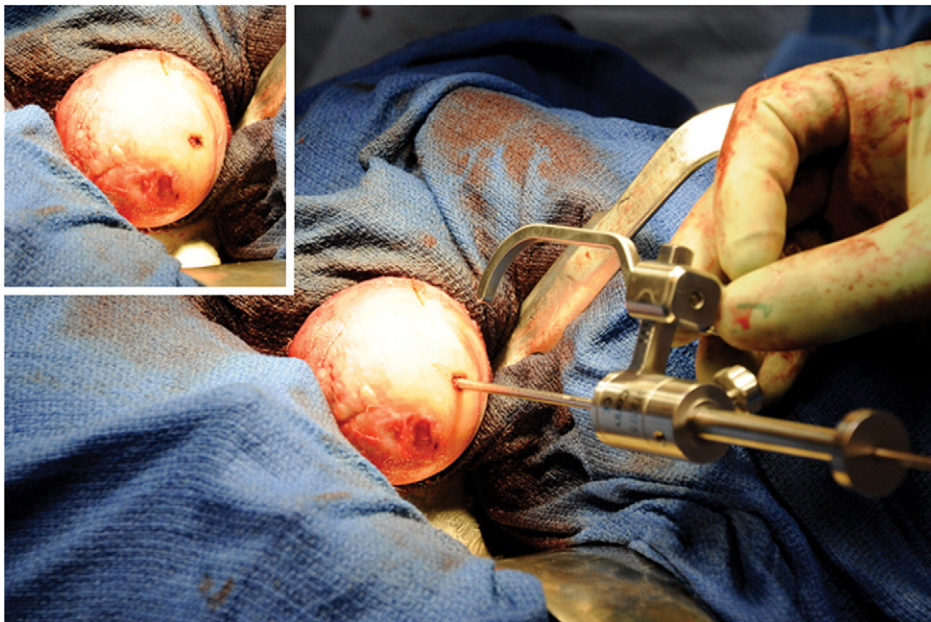


Fig. 2. Inset upper, Localization of the pin hole perforation in the femoral head. This is typically NOT in the center of the femoral head. Main, A 2.8-mm pin is then passed antegrade down the previously drilled tract, so the head can be prepared in standard fashion.

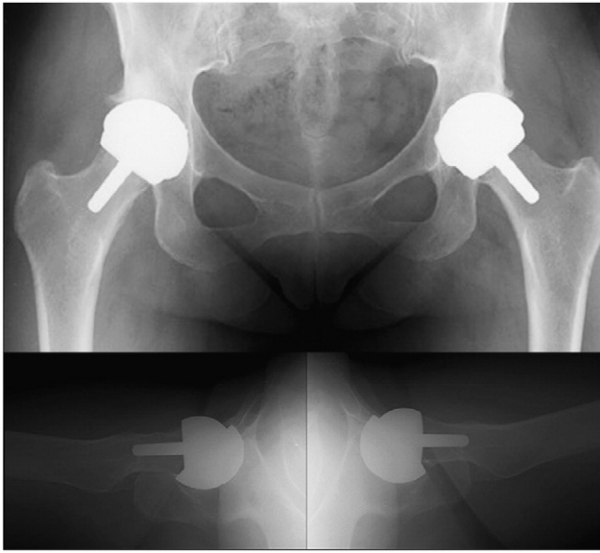


Fig. 3. Postoperative radiographs. Note the implants in slight valgus in the coronal plane and pin tracts exiting at the lateral cortices at the level of the lesser trochanter. The stems are in the center-center position in the femoral neck in both planes.

point of the retrograde pin that was placed at the start of the case (Fig. 3). Another 2.8-mm guide pin is then placed bluntly into this tract in an antegrade fashion. This is already known to be in the center-center or desired position in the femoral neck. Although not typically necessary, a final fluoroscopic view can be obtained to verify that this pin is in the desired position and that a new tract was not created with the antegrade advancement of the pin. From this point onward, the hip resurfacing is carried out according to the implant guidelines and surgeon preference with assurance of accurate placement of the femoral component. This method ensures that the stem is centered in both the coronal and sagittal planes.

Discussion

The most challenging elements of hip resurfacing using the posterior approach are adequate acetabular exposure and accurate placement of the guide pin for femoral head preparation. We have successfully used this technique in 20 cases and have not encountered any problems. In particular, we have not had a pin break; and when rotation of the hip is limited, the freedom of fluoroscopic C-arm usually allows adequate orthogonal views of the femoral neck. Pin breakage should be very rare because the purpose of the pin is to create a pilot hole, and it is removed after the hole is made. With patience, a low threshold to extend the surgical exposure, and the use of adjunctive Steinman pins, the acetabulum can usually be visualized well enough for reliable and accurate cup placement. However, despite the commonly used commercial pin guides, the placement of the femoral guide

pin remains a challenge. Wirth and Gossé [4] published in 2006 a similar technique using guide pins to improve implantation for resurfacing. They found that there was greater precision with central drilling of the neck than with the manufacturer's centering device. The main difference in our technique compared with the Wirth and Gossé publication was that our technique used a 2.8-mm terminally threaded pin similar to that used for implantation of a dynamic hip screw. In addition, without the use of fluoroscopy, it is not uncommon to see a malpositioned femoral component because of the lack of reliability using these pin guide devices. We believe that the use of a predrilled retrograde pin is easy for the majority of orthopedic surgeons because its placement is identical to the guide pin for a dynamic hip screw—a procedure that all orthopedic surgeons are typically very comfortable performing. The use of this retrograde pin gives the surgeon freedom to place the pin in any position needed, and the fluoroscopic images provide immediate feedback in addition to a glimpse of the final position of the femoral component stem. Fluoroscopy and pin placement do not add significant time to the surgery because the surgeon can obviate the use of the jigs, which are sometimes awkward to use. Furthermore, the fluoroscopy can also be used to assess the cup position and its seating, as it can be difficult to determine when monoblock metal cups are fully seated. We believe that the small radiation exposure is a worthwhile compromise for a reliable and accurate position of the femoral component that is known to significantly contribute to the longevity of the implant. In conclusion, we believe that this technique for guide pin placement permits accurate placement of the femoral guide pin and allows for early feedback and confidence during femoral component implantation.

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