Cross-Hip X-ray View for Proximal Femoral Osteotomies

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Abstract

Placement of the blade-plate chisel into the femoral neck can be challenging at times, due to patient positioning and imaging issues. We describe a technique of intraoperative visualization of the femoral neck and head for safer placement of the hardware.

Proximal femoral osteotomy is a commonly performed procedure for many pediatric conditions (eg, developmental dysplasia of the hip, coxa vara, Legg-Calvé-Perthes disease).[1-3] Fixed-angle blade plates or screws and side plates are the accepted methods of fixation.[4-6]

During the placement of the blade-plate chisel into the femoral neck, once the path is created, further adjustments are not possible. In order to minimize the chance of error and to improve the precision of blade placement, most of the current designs utilize a cannulated chisel and blade plate system.[5]

Regardless of the implant used, the guide wire needs to be placed in the center of the femoral neck and head to allow enough space for the blade (or hip screw) within the bone. This is performed under fluoroscopic guidance, and one of the prerequisites for a precise placement of the blade plate or hip screw is to obtain a perfect lateral view of the femoral neck and head.[2,7]

The usual way of obtaining an appropriate lateral view of the femoral neck and head is the flexion and lateral abduction view (frog lateral). However, when the proximal femur is deformed into coxa vara, sufficient abduction of the hip, necessary to perform the frog lateral view, is prevented. Furthermore, the usual intraoperative positioning of the patient for such surgery is with the pelvis tilted up on the operative side. This positioning further limits the ability to abduct the hip and, in turn, prevents adequate frog lateral positioning for imaging. An additional problem with this intraoperative positioning is that abduction with a guide wire in place will bend the guide wire against the operating table or the lateral soft tissues of the hip. A bent guide wire can lead to difficulty with drilling or positioning of the blade or hip screw. The small size of a child on an adult operating table can make obtaining cross-table lateral imaging difficult. Limited abduction in such small children makes imaging even more difficult. Repeatedly

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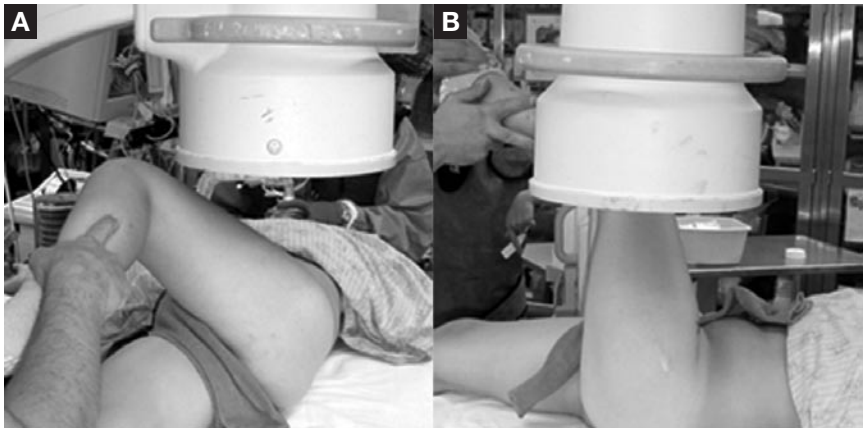

Figure 1. The setup for the cross-hip x-ray view is performed with the image intensifier on the opposite side of the operative site and the patient's leg positioned in maximum adduction (A) with the hip flexed to 90° (B).

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Am J Orthop. 2009;38(6):306-307.

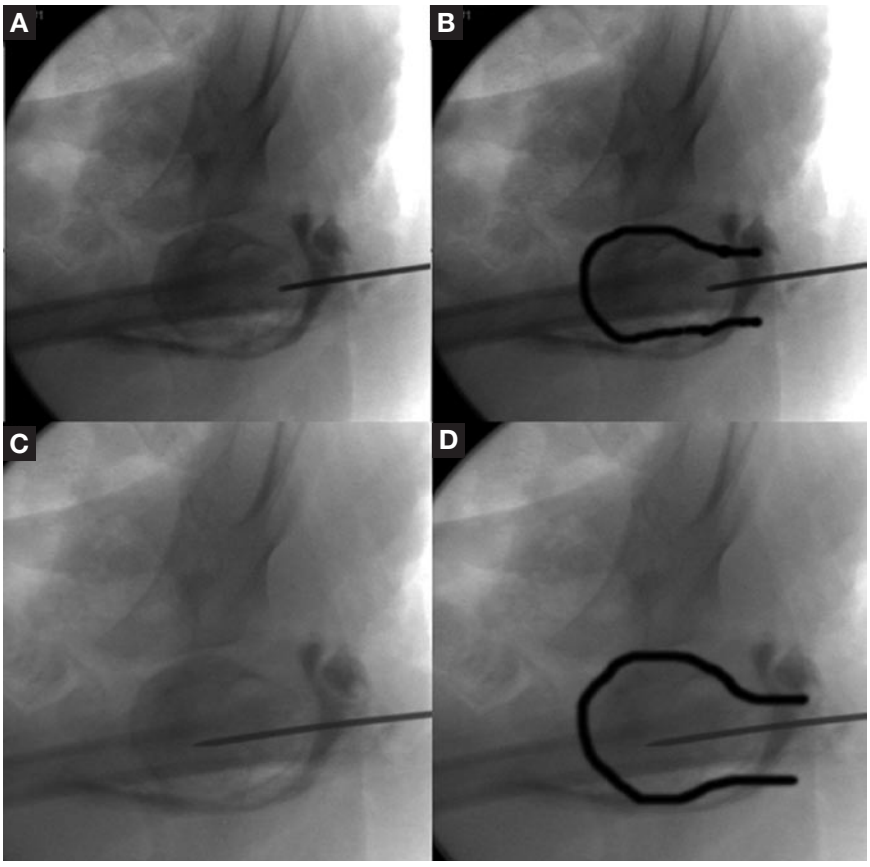

Figure 2. Fluoroscopic images of the proximal femur demonstrate the insertion of the guide wire (A, C). Note that in the described position of full adduction of the hip in 90° of flexion there is overlap of the femoral diaphysis over the neck. The femoral head outline is easily visualized (A-D).

changing the position of the imaging machine can add considerable time to the procedure.

The Cross-Hip X-ray View

Therefore, we developed a new technique—the cross-hip x-ray view—for obtaining accurate lateral viewing of the femoral neck and head, even in varus deformed hips. Furthermore, this positioning does not cause bending of the guide wire. The cross-hip x-ray view is performed with the hip flexed 90° and adducted. The C-arm x-ray is placed on the contralateral side to the operated hip. The x-ray beam aims straight down at the hip in the usual fashion for an anteroposterior view (Figure 1).

The cross-hip x-ray view permits overlap of the femoral shaft on the femoral neck and center of the femoral head. Internal and external rotation from this position provides oblique views of the neck and head (Figure 2). The lateral femoral shaft at the site of entry for the guide pin is clearly visible. The course of the guide pin as it enters the neck and head are clearly visible as the pin enters the femoral head (Figure 3). The anteroposterior view is obtained in the traditional fashion.

At the end, when the side plate is applied, the cross-hip lateral view clearly shows the alignment of the blade or hip screw, the head and neck, the side plate, and the shaft of the femur. In very young children or when the femoral head cannot be fully appreciated, an arthrogram can precede the cross-hip x-ray view to help delineate the anatomy.

Authors' Disclosure Statement

The authors report no actual or potential conflict of interest in relation to this article.

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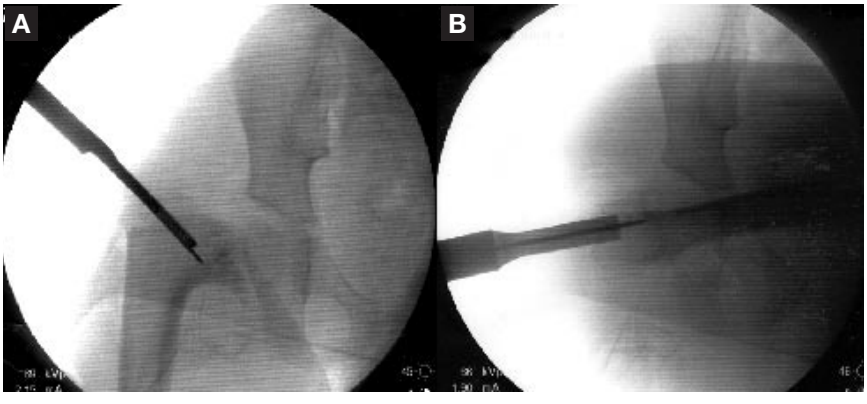

Figure 3. Anteroposterior (A) and lateral (B) intraoperative fluoroscopic images show perfect placement of the chisel into the femoral neck and head.