

Avoiding Being Mislead by the Extramedullary Guide Pin : A Brief Report

BANCHONG MAHAISAVARIYA
CHAVENGSAKDI SUIBNUGARN
PORNCCHAI TECHANIVATS

Department of Orthopaedics and Rehabilitation Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand.

Abstract : An extramedullary guide pin is usually used to mark the site of insertion of an anteroposterior image in which the beam is perpendicular to the long axis of the femur. The image of the guide pin location in relation to the femoral head and neck will change corresponding with the direction and degree of deviation of the beam from the perpendicular projection. This can mislead the surgeon as to the site of insertion of an angled blade plate and results in poor fixation.

INTRODUCTION

The fixed angled blade-plate is widely used to stabilize fractures in the trochanteric and subtrochanteric regions. The precise application of such a device requires an appropriate site and corresponding anteversion of blade-insertion. Because the area of the femoral head and neck region in Asean-sized patients is limited, this makes the use of an intramedullary guide wire as a reference anatomic level just above the site of insertion of an angled blade plate is usually inconvenient and impractical. To mark the site for insertion, the extramedullary guide pin proposed by Tronzo in 1974¹, combined with the use of an image intensifier is widely accepted. This guide pin also acts as a reference plane for anteversion of the proximal femur for blade insertion. According to its extramedullary placement, the image of the guide pin location in relation to the femoral head and neck would vary with the different angles of roentgenographic projection (Fig. 1). This experiment was performed to draw attention to such phenomena and to reveal the presenting location on the image screen of the properly-placed guide pin in relation to the angles of C-arm image projection.

MATERIALS AND METHODS

Five cadaveric femora were used in this study. A Kirschner wire was used as a guide pin. This pin was placed at the mid part of the anterior cortex along with the central head-neck axis and was fixed into the flaring part of the femoral head. The AP-image of the guide pin would appear at the

central part along with the femoral head and neck when the beam is perpendicular to the long axis of the femur. The study was carried out using AP projection with different angles, which were made to deviate from the perpendicular projection by tilting both cephaladly and caudadly with 5 degree increments from 0 to 20 degrees (Fig. 2). The image of the guide pin would appear at a distance away from the central head and neck axis. This distance was measured by three observers and the mean value was used for analysis. Because the cross section of the femoral neck was oval in shape and the magnification was not uniform in each projection, we used the diameter at the mid-part of femoral neck in each image as a reference for this study (Fig. 3).

RESULTS

The AP image of the extramedullary guide pin, being placed at the mid part of the anterior cortex of the femoral neck, would appear at a distance equal to 1.3 percent of the neck diameter and would appear on the same image inferiorly to the central head neck axis for each degree of the cephaladly tilting of the image projection. It would also appear at a distance equal to 1.1 percent of the neck diameter superiorly to the central head neck axis for each degree of the caudadly tilting of the image projection (Fig. 3).

DISCUSSION

To mark the site of insertion of an angled plate by using an extramedullary guide pin, the x-ray beam should be perpendicular to the long axis of the femur. In some circumstances when the projection is not perpendicular to the long axis of the femur because of errors of positioning of the patients limbs in excessive flexion or because of an extended attitude of the hip or any obstruction of positioning of the C-arm image intensifier, the location of guide pin as it appears on the image screen may mislead the surgeon if he is not aware of such phenomena. Knowledge of its apparent location in relation to the angle of projection may facilitate proper interpretation and precise placement of the fixation under such conditions.

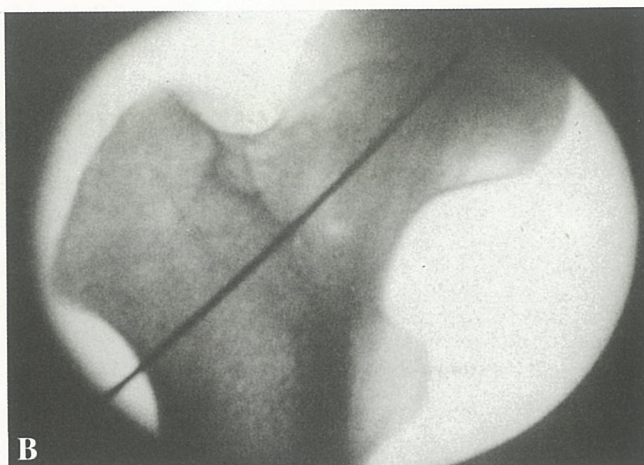
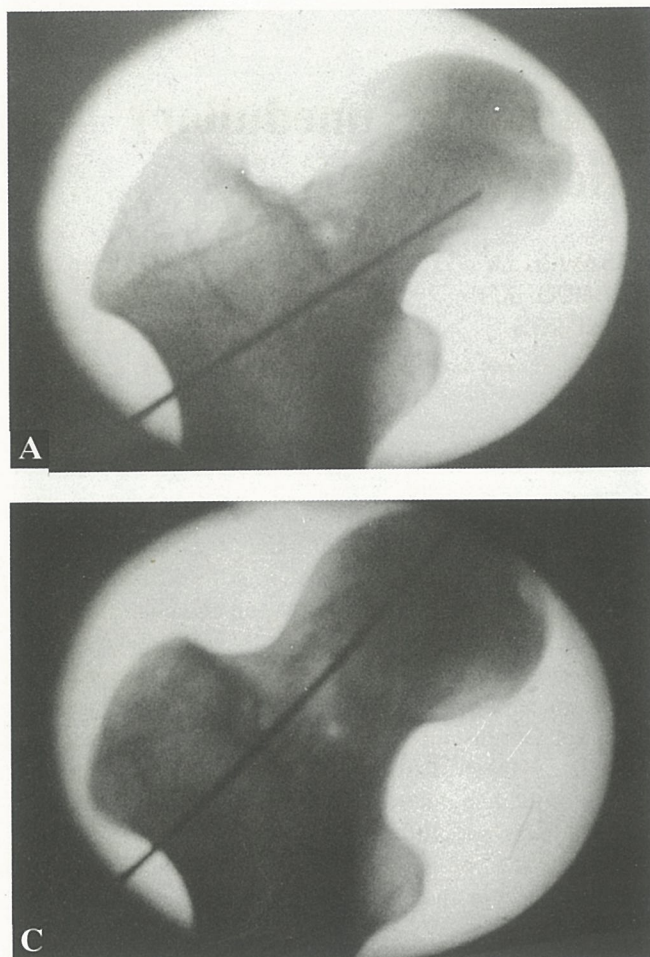


Fig. 1 The pictures show the apparent location on the image screen of the same guide pin from different angles of fluoroscopy.

- A. 15 degree cephaladly tilting.
- B. perpendicular projection.
- C. 15 degree caudadly tilting.

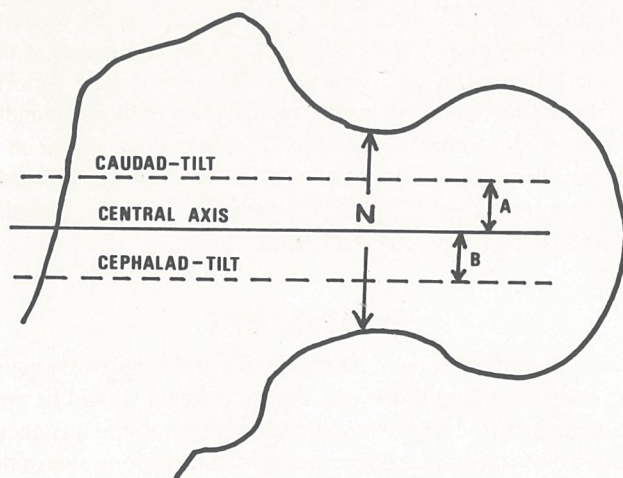


Fig. 3 Diagramme shows the position of guide pin on the image screen from this experiment. It is located at the central axis when a perpendicular image projection is used and is located at a distance A and B superiorly and inferiorly to the central axis when the image intensifier is tilted caudadly and cephaladly respectively. N is the neck diameter used as a reference for comparison in this study.

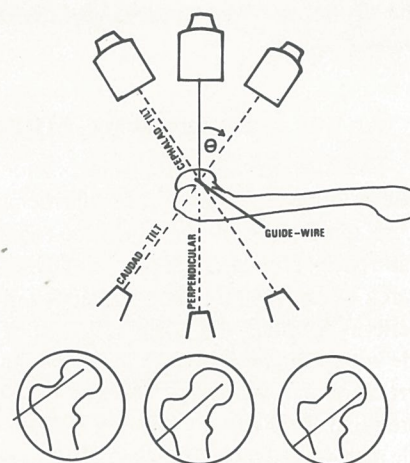


Fig. 2 Diagramme shows the location of the same extramedullary guide pin from various projections of the image intensifier.

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REFERENCE

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