Well-Leg Positioning on a Fracture Table: Using a Pillow Sling

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The development of acute compartment syndrome in lower legs placed in the lithotomy position is a rare complication reported within various surgical subspecialties, including general surgery, gynecology, and urology.1-5 Although it is reported in arthroscopic knee cases, the more frequent occurrence in orthopedics, based on available case reports, appears to involve the well (uninjured or contralateral) leg placed in the hemilithotomy position on the fracture table.6-9 Prior studies have found significantly elevated lower leg compartment pressures in legs placed in the lithotomy position. Chase and colleagues10 measured the anterior compartment pressures in 16 limbs placed in the lithotomy position. They found minor elevations after initial lithotomy positioning, but gradual increases over time, with an average elevation to 30 mm Hg and maximum of 70 mm Hg. Similarly, Meyer and colleagues11 recorded the lower leg pressures in 8 healthy volunteers positioned on a fracture table. Changing from the supine position to the lithotomy position significantly increased the intramuscular pressure in the anterior compartment (from 11.6 to 19.4 mm Hg) and in the lateral compartment (from 13.0 to 25.8 mm Hg).

Along with increased intramuscular pressures, local hypotension occurs in lower legs placed in the lithotomy position. Mean diastolic blood pressure in the ankle was 63.9 mm Hg in the leg placed in the supine position as opposed to 34.6 mm Hg in the same leg placed in the lithotomy position.10 This finding is not unexpected, given that local arteriolar pressure decreases by 0.78 mm Hg for every 1.0 cm of elevation.13-14 Furthermore, some “kinking” of either femoral vessels at the hip or popliteal vessels at the knee may also occur.15 For prevention of these problems, the well leg can be placed in a position of slight hip extension and full knee extension on the fracture table—the so-called scissored position. This position is commonly achieved with an additional traction boot and support bar connected to the well leg. However, this additional setup can make positioning the C-arm machine difficult; there is obstruction by the additional support bars and the leg itself. In addition, the uninjured extremity may be placed into positions that cause unnecessarily high stresses across the joints and can potentially lead to iatrogenic injury and pain.

Risk of fracture in the well leg results from the C-arm machine abutting the well leg when swinging through to obtain a lateral image. This problem is overcome by securing the well leg to the fracture table’s longitudinal support bar using a pillow sling, thereby reducing the risks of compartment syndrome, allowing the uninjured limb to be in a relaxed position, and allowing good fluoroscopic images to easily be obtained. This brief report is an introduction to this positioning method.

Surgical Technique
The patient is intubated and anesthetized on the hospital bed before being transferred to the fracture table. On the fracture table, the operative leg is placed in a boot traction device in the standard fashion. The perineal post is then inserted, and the patient is pulled caudally on the bed so that the post is appropriately positioned for countertraction. With an assistant holding the well leg, the distal flat-top table extension is removed. With a calf or foot sequential compression device still in place, a pillow enclosed in a pillow-case is wrapped around the lower leg...
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and ankle in a U-shaped fashion using the longitudinal length of the pillow (Figure 1). The pillow-wrapped leg is then placed against the side (not the top) of the table’s support bar and secured in place using a 6-in self-adherent compression bandage (eg, Coban; 3M, St. Paul, Minnesota), wrapped circumferentially around both the pillow and the support post (Figures 2A, 2B). Although an Ace wrap may be more readily accessible, we have found it to slowly loosen and/or migrate, thus potentially changing the leg position throughout the case.

As shown in Figure 3, the C-arm machine can then be positioned in an oblique fashion relative to the bed with an unobstructed view of the hip. The C-arm can also be repositioned perpendicularly to the injured limb, and unobstructed images can be obtained of the entire length of the femur. This quick and efficient setup of the well leg allows for an optimal amount of relaxed hip and knee extension, and limb adduction to midline along the table’s support bar, to permit lateral fluoroscopic imaging of the injured limb without overlap of the well leg or interference with C-arm positioning.

Results
For more than 2 years, Dr. Mir has used the pillow-sling technique for placement of the well leg in the scissored position on the fracture table in all patients. Between September 2010 and January 2013, he applied the technique 93 times, with the procedures listed as follows with their Current Procedural Terminology (CPT) codes: 14 cases of percutaneous fixation of femoral neck fracture (CPT 27235), 8 cases of treatment of intertrochanteric or subtrochanteric fracture with plate/screw type implant (CPT 27244), 34 cases of treatment of intertrochanteric or subtrochanteric fracture with intramedullary implant (CPT 27245), and 37 cases of treatment of femoral shaft fracture with intramedullary implant (CPT 27506).

With respect to compartment syndrome, there were no intraoperative or postoperative complications. Furthermore, no patients complained of pain in the well leg immediately after surgery or at subsequent follow-ups. No difficulty was encountered with intraoperative C-arm imaging of the injured limb at the...
hip or along the length of the femur in the lateral or anteroposterior planes. The well leg did not have to be repositioned in any cases to achieve adequate imaging of the hip and femur.

**Discussion**

Although rare, acute compartment syndrome remains a potential yet avoidable complication of the lithotomy position. Some surgeons avoid this setup of the well leg on the fracture table and instead use a scissored position for the uninjured limb.

In this report, we presented a safe and efficient technique for placing the well leg in a scissored position on the fracture table using a pillow and a self-adherent compression bandage. We did not compare the pillow-sling with other well-leg positioning techniques but instead described a reproducible technique that we have used effectively and successfully, even with multiple morbidly obese patients who met the weight limits for the fracture table.

In addition, even with consistent use of this pillow-sling technique at our high-volume trauma center, there have been no complications, such as compartment syndrome, well-leg pain, or difficulty in intraoperative imaging of the injured limb. The pillow-sling is a safe and expedient alternative technique for well-leg positioning on the fracture table, and it can be easily reproduced by other surgeons.

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**References**


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