

Procedure for Bone Marrow Aspiration from the Posterior Iliac Crest

October 2012

Philippe Hernigou, MD

PATIENT POSITIONING

1. Lateral decubitus position, patient's eyes away from the operator.
2. Patient's knee and hip flexed to about 45 degrees.
3. Put a soft pillow under the head and the waist to prevent tilting of the pelvic.
4. Some surgeons prefer to put another pillow in between the knees to make the patient comfortable.

LOCATE THE SITE FOR BONE MARROW COLLECTION

1. Palpate the iliac crest and identify the posterior iliac crest spine (Fig. 1).

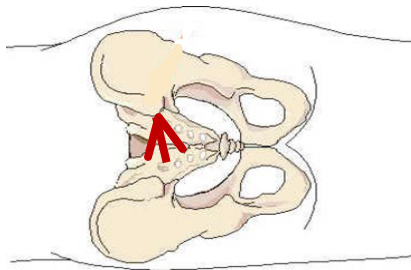


Fig. 1. Demonstration of the posterior iliac crest spine (arrow).

2. Outline the iliac crest and the posterior iliac crest spine by surgical marking pen.
3. Using the thumb and index finger to identify the outer and inner edges of the posterior iliac crest, posterior iliac crest spine, and estimate the width of the posterior iliac crest spine. Mark the center point of the posterior iliac crest spine using a surgical marking pen.
4. Although the entire posterior iliac crest could be used for bone marrow collection, the posterior iliac crest spine is the most common area from which bone marrow is collected because of its prominence, easy access, and thicker wall.

SKIN PREPARATION AND LOCAL ANESTHESIA

1. Prepare the skin following standard procedures.
2. If the patient is anesthetized, then no topical anesthetic is required. Otherwise, topically anesthetize the insertion point following standard procedures.
3. Place a sterile drape with a fenestrated opening over the area to be operated on.

PREPARATION OF THE SYRINGES AND JAMSHIDI NEEDLE

1. On the sterile field, make a sufficient volume of Heparin Solution (1,000 U/mL) to allow for rinsing of the syringes and needles to be used during the bone marrow aspiration. For example, if the target volume of bone marrow aspiration is 60cc, 4-5 30cc syringes should be prepared, so make at least 40cc of the Heparin Solution.

2. Just prior to aspiration, rinse the needles and transfer syringes with the heparin solution equivalent to at least half of the syringe's volume, pulling the plunger all of the way out, and rotating and rocking the syringe to ensure contact between the heparin solution and the inner surface of the syringe.
3. Expel the heparin solution from all the syringes, needles and the Jamshidi needle assembly.
 - 1) Remove the stylet from the Jamshidi needle and attach a 30cc syringe filled with heparin to the luer-lock connection.
 - 2) Flush the heparin through the Jamshidi needle and into the heparin solution cup on the sterile field.

Note: Heparin from only one 30cc syringe needs to be expelled through the Jamshidi needle.

ASPIRATION OF BONE MARROW

1. Introducing the Jamshidi-type needle (note that the Jamshidi and all aspiration syringes should be rinsed before introduction into the iliac crest described above). Adjust the angle of the needle insertion based on the contour of the patient's iliac crest identified above to ensure the safe advancement of the needle. It may be necessary to make a small (2 mm) skin incision if the patient is obese. In general, use the index finger and thumb of the left hand to immobilize the top skin tissue over the iliac crest and then make an incision, if needed.
 - 1) Introduce the Jamshidi needle at the insertion point and advance the needle through the dermal layer.
 - 2) Slide the needle tip on top of the iliac crest bone laterally and medially to feel the width of the iliac crest.
 - 3) Position the needle in the middle thickness of the iliac crest, perpendicular to its curvature. The needle should be directed with as target the center of the femoral head.
2. Advancing the Jamshidi needle: once the needle is correctly positioned on top of the iliac crest, either hand-push the needle tip through the cortex of the crest or have an assistant taping the Jamshidi needle handle. While the surgeon continues to palpate the iliac crest with the one hand and stabilizes the needle with another hand in order to maintain the appropriate needle orientation. However, once the needle tip has penetrated the bone, manually advance the needle between the inner and outer walls of the iliac crest to a depth of 5cm (5cm is enough at the posterior part due to the presence of the sciatic nerve).
 - 1) Aspirate 3cc of the ACD-A (Acid Citrate Dextrose Anticoagulant) into each 30cc syringe and hand the ACD-A loaded syringe and the rinsed Jamshidi needle to the surgeon.
 - 2) Once positioned within the posterior iliac crest, the bone marrow collection will begin at the 5cm level of depth.
 - 3) Rapidly pull the plunger back to the "15cc" level to initiate bone marrow aspiration.

- 4) Collect 4-10cc of bone marrow.
- 5) Rotate the jamshidi needle (at least 90° clockwise or anti-clockwise) and rapidly pull the plunger back to the “30cc” level to continue to aspirate bone marrow.
- 6) Once the collection syringe is approximately half full replace it with a fresh syringe (loaded with 3cc of ACD-A).
- 7) Pull back on the jamshidi needle approximately 2 cm and repeat the aspiration sequence at the new level.
- 8) Depending on the volume of aspirated bone marrow per draw, it may be possible to collect the target volume from three levels in the first channel.

If a sufficient volume of bone marrow has not been aspirated from the first channel, then the jamshidi needle should be repositioned approximately 2 cm anteriorly from the first channel. Maintain parallel tracts when performing multiple channel aspirations.

PROCESSING THE BONE MARROW FOR BONE MARROW CONCENTRATE

1. The surgeon should immediately hand the syringe filled with bone marrow to an individual on the sterile field who will gently shake the syring in order to achieve good mixing of the viscous bone marrow aspirate and the ACD-A.
2. After mixing the contents in the syringe, the bone marrow should be loaded into the disposable device (MXP bagset or ART 21 device).
3. After the target volume of bone marrow has been collected the devices containing the bone marrow should be passed to the bone marrow concentration equipment operator in order to generate the Bone Marrow Concentrate (BMC) following standard procedures.

