

# **Bone Marrow Procedure**

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**Orientation 7/5/2006**

# Outline



- ⌘ This presentation focuses only on practical points in the technical procedures, not on diagnostic aspects of bone marrow examination
- ⌘ We will talk about: bone marrow aspirate and biopsy procedures
- ⌘ The materials here represent common practice in our hospital settings (LBJ and Hermann). Information is useful for orientation of new residents

# Scheduling of bone marrow

- ⌘ LBJ: requesting physicians call Pathology residents to schedule bone marrows. Time slots: 9:00, 10:00, 11:00, 12:00. Opportunity to discuss about indication
- ⌘ Hermann: requesting physicians call Hematology lab to schedule bone marrow (bone marrow schedule book). Time slots: 9:00, 10:00, 11:00, 12:00
- ⌘ Info to obtain for procedure: patient name, location, MRN, DX, flow, cytogenetics, name of requesting MD and pager number

# Pre-procedure



- ⌘ Consent form to be signed by patient before premedication. Pay attention to witness signature
- ⌘ Premedication (patient's option):
  - Small body weight: Demerol 25 mg, Phenergan 12.5 mg
  - Others: Demerol 50 mg, Phenergan 25 mg (if patient needs more, give Demerol 25 mg later)
  - IM only

## Pre-procedure (cont'd)



- ⌘ Patients with extreme anxiety:  
arrange with anesthesia for deep sedation

# Medication summary



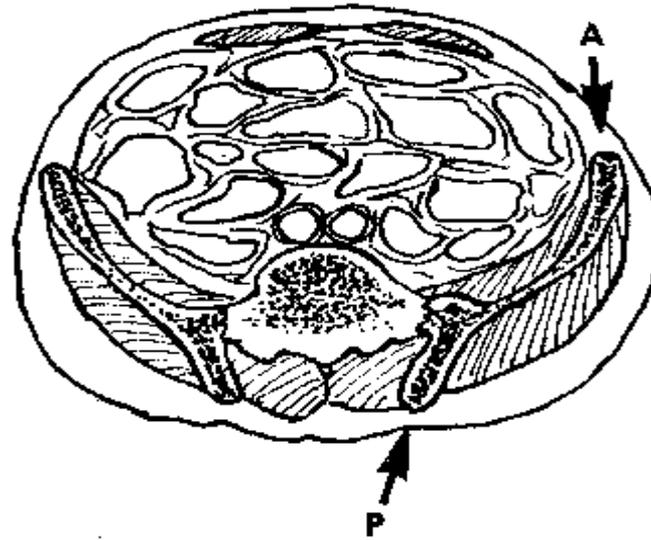
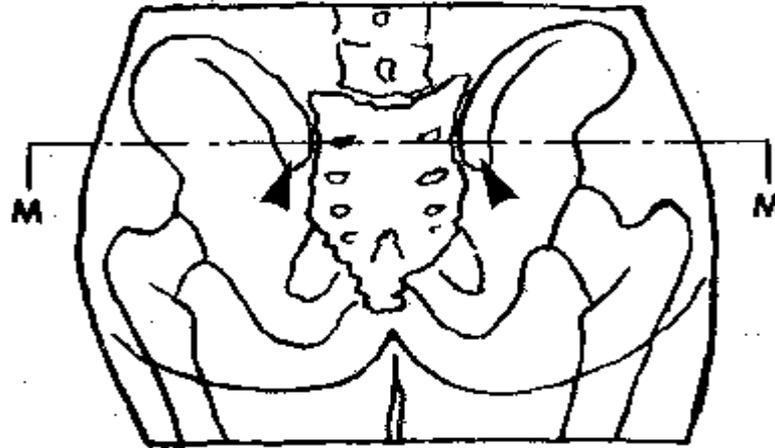
- ⌘ Demerol: meperidine HCl, for analgesia and sedation, rapid onset with short duration
- ⌘ Phenergan: promethazine HCl, a phenothiazine derivative, for sedation (also antihistamine, anti-motion sickness, anti-emetic, anti-cholinergic)

# Sites for sampling



- ⌘ 1st choice: posterior superior iliac crest.  
Relative safe
- ⌘ 2nd choice: anterior iliac crest. May need for obese patient. Watch out for vessels and nerves
- ⌘ 3rd choice: sternum. Use needle guard to prevent going down so deep. May cause laceration of the heart, also cannot get biopsy

# Fig 1. Posterior (P) and anterior (A) iliac crests of the ilium



## Locate the site



- ⌘ Posterior superior iliac crest of the ileum: the crest should be about 2 finger-breadth away from the spine center-line. Palpate to feel the crest before marking it
- ⌘ Anterior iliac crest: palpate to feel the crest
- ⌘ Patient should lie down flat (on stomach or back) throughout procedure. Body movement can relocate the crest site. Lateral position can be used if patient cannot lie on stomach or back)

# Steps in procedure



- ⌘ Patient must have had premedication 15-20 min earlier (IM) before using needles on patient
- ⌘ Put on sterile gloves
- ⌘ Have the marrow kit opened by others
- ⌘ Clean the marked area with Betadine then alcohol. Put the drape (with a central opening) over the marrow area. Keep this field sterile throughout the procedure
- ⌘ Always tell patient what you will do next

## Steps in procedure (cont'd)



- ⌘ Use 1% lidocaine: make a subcuticular bleb with a small gauge needle (25 gauge). Come in with bevel up at a shallow angle. Subsequent needles will go through this bleb
- ⌘ Change to larger needle (21 gauge), go straight to the periosteum to inject lidocaine in the projected area of penetration. Also use the needle to inspect the area for margin

## Steps in procedure (cont'd)

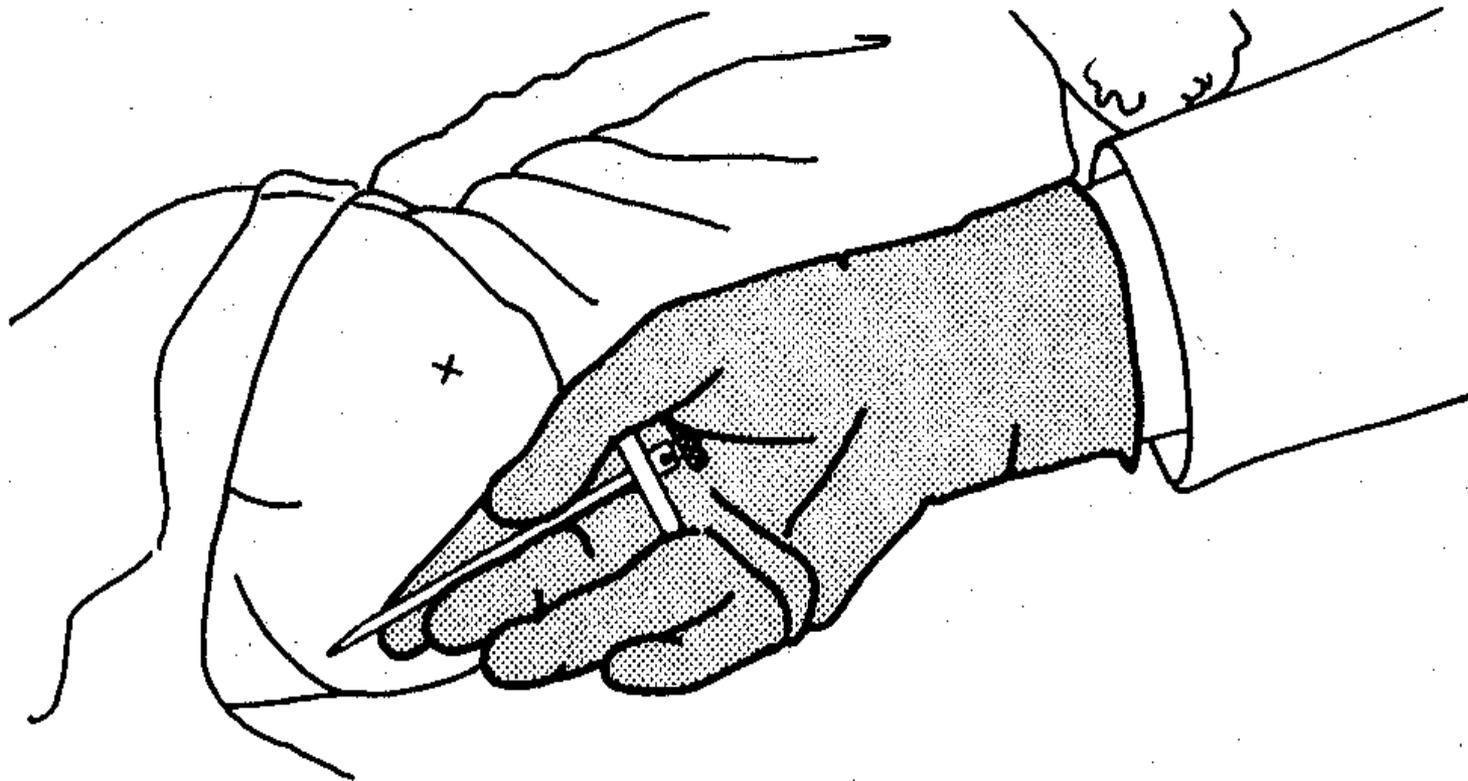


- ⌘ Obese patient: use spinal tap needle for lidocaine (20 gauge)
- ⌘ Make an incision with a scalpel. Apply pressure to prevent blood loss

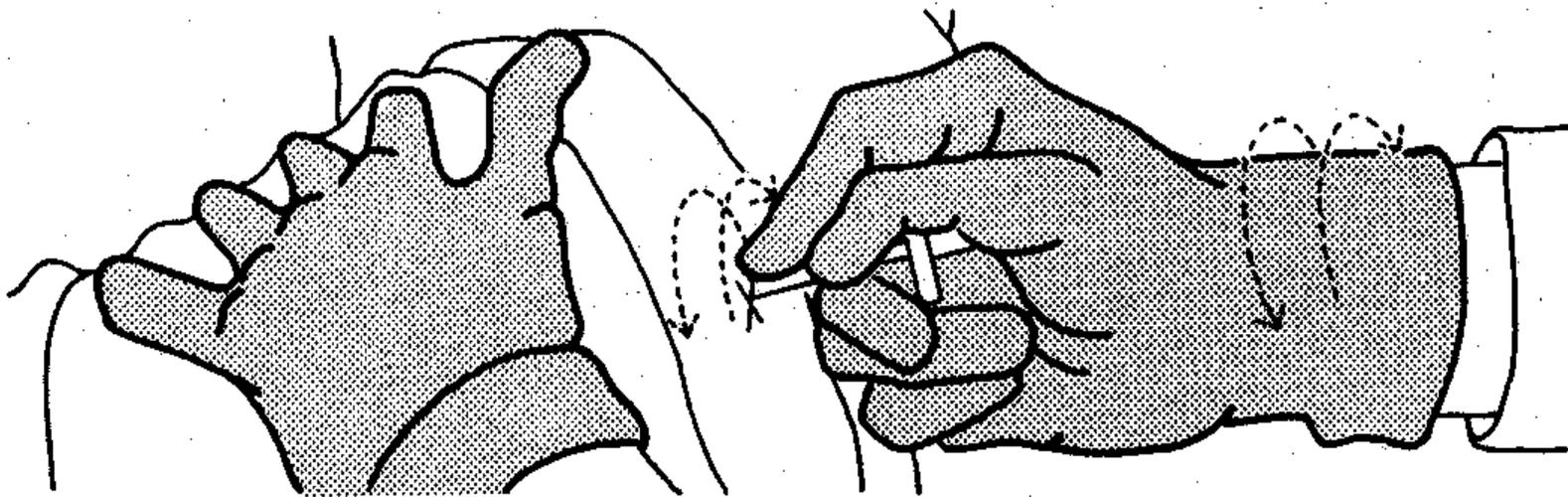
## Steps in procedure (cont'd)

- ⌘ Wait for about 5 min for lidocaine to work. Use this time to: check the marrow needles, prepare heparinized syringes for special studies (flow cytometry or cytogenetics)
- ⌘ Figures 2-3: use Illinois needle (with obturator inside) to go into the iliac crest with clockwise and counter-clockwise motion. When it penetrate the bone-> a slight "give". Take out the obturator and aspirate 0.5-1.0 ml of aspirate quickly with a plain syringe

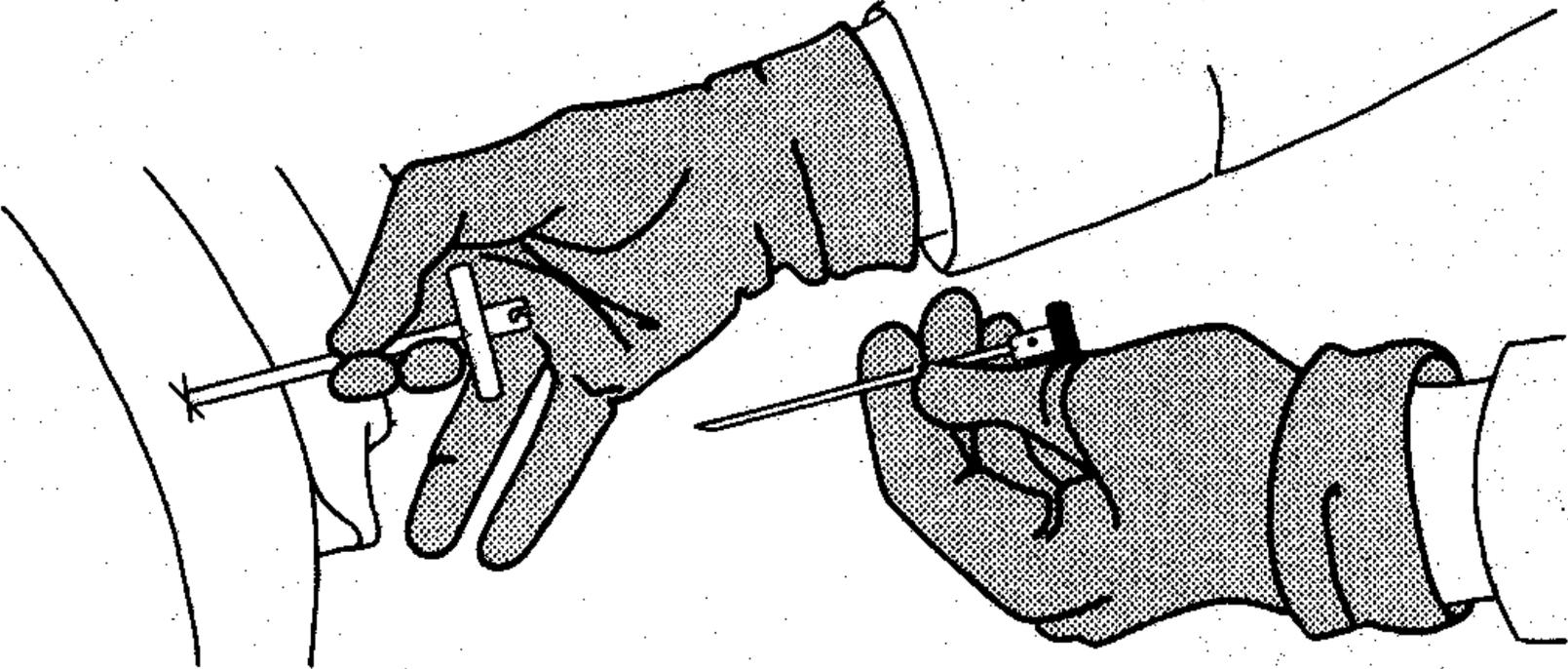
**Fig 2. Illinois aspirate needle with obturator in place**



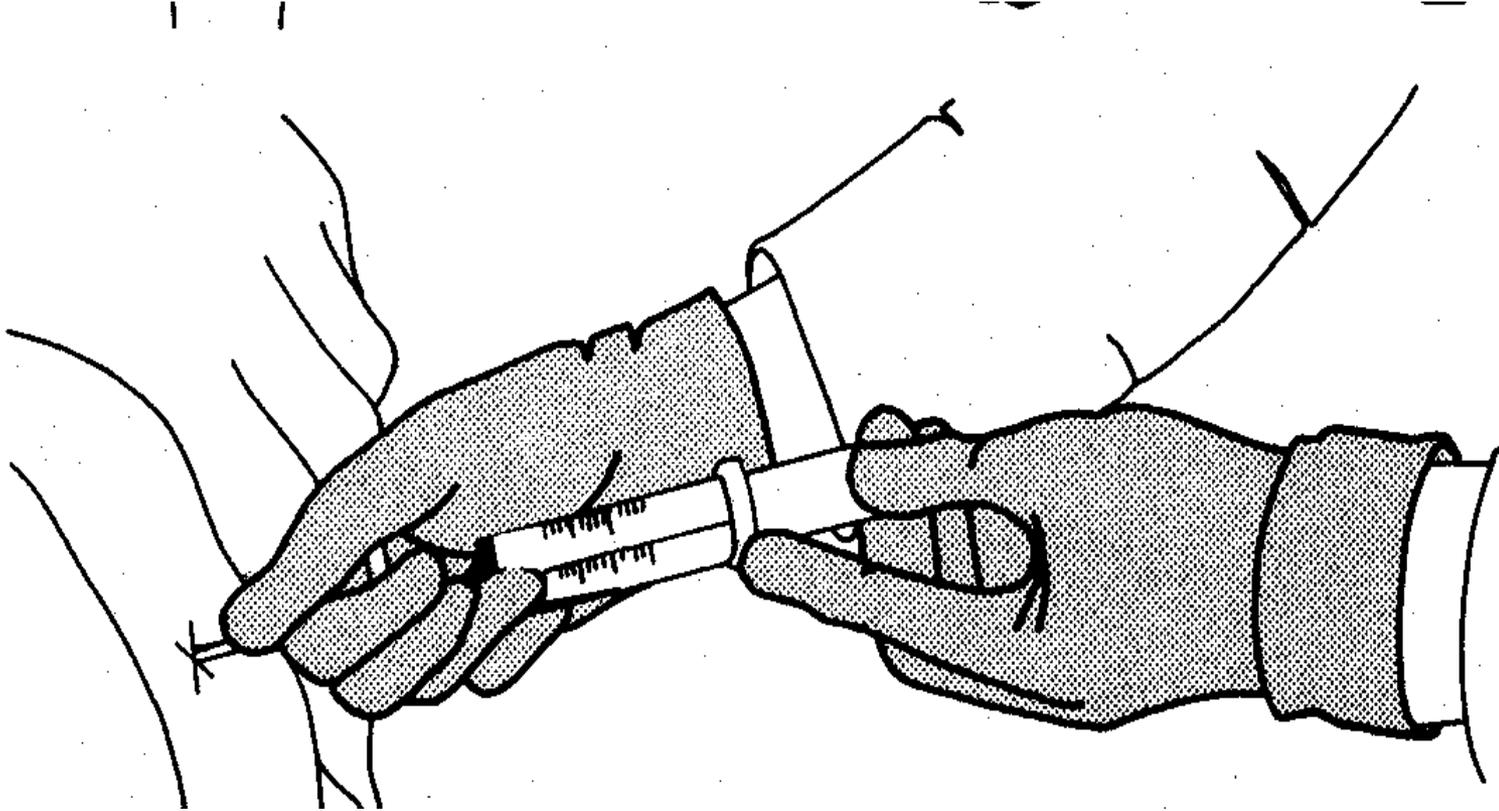
**Fig 3. Advance the Illinois aspirate needle until a slight “give”**



**Fig 4. Remove the obturator**



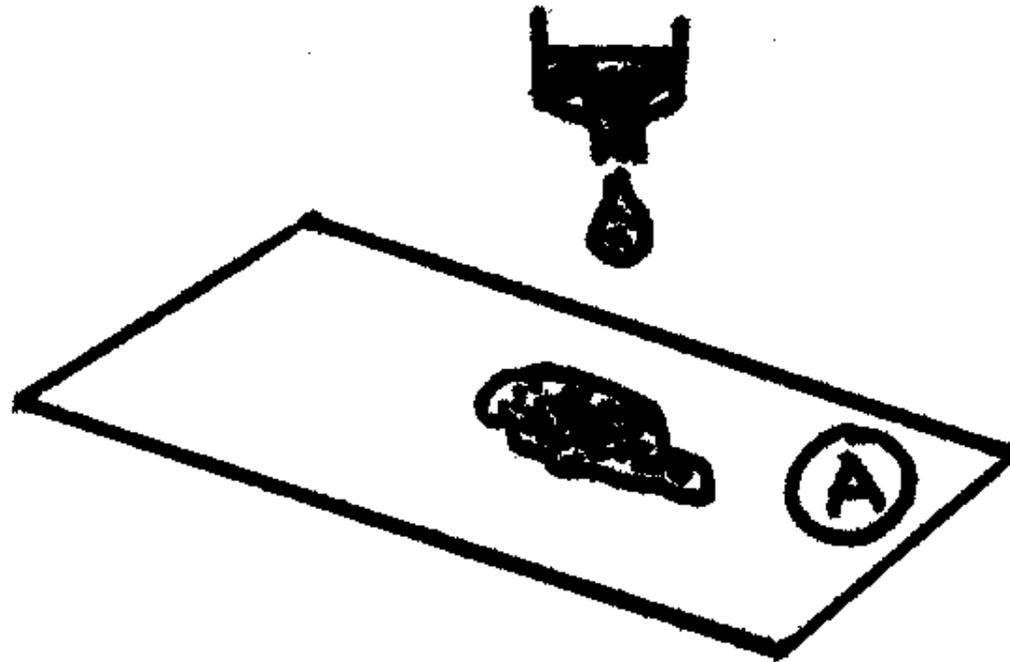
**Fig 5. Aspirate 0.5-1.0 ml**



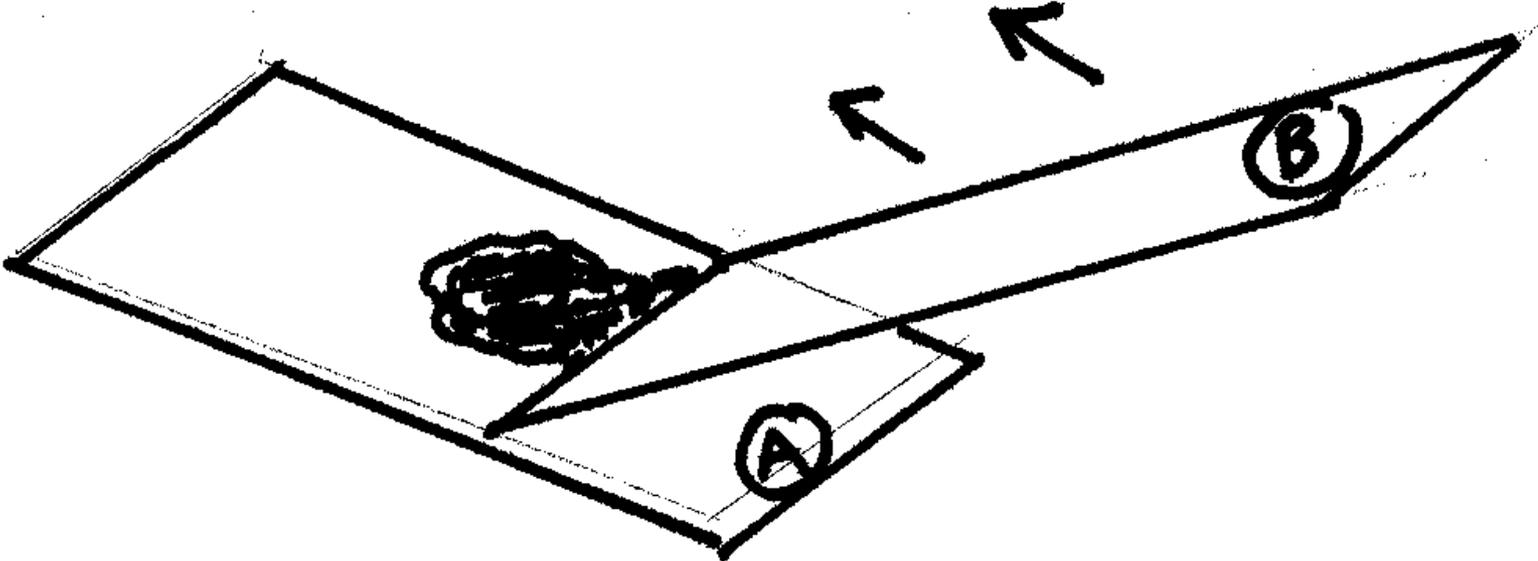
## Steps in procedure (cont'd)

- ⌘ Figures 7-10: have technologist put drops of aspirate on an inclined slide. Look for spicules (granular). Technologist will make crush preps quickly to avoid clotting
- ⌘ Get 2 ml of aspirate in each syringe for flow, cytogenetics, and microbiology if needed
  - flow, cytogenetics: heparinized syringe-> green top tube (LBJ), red top tube (Hermann)
  - Micro cultures (AFB, fungal): plain syringe-> yellow top tube

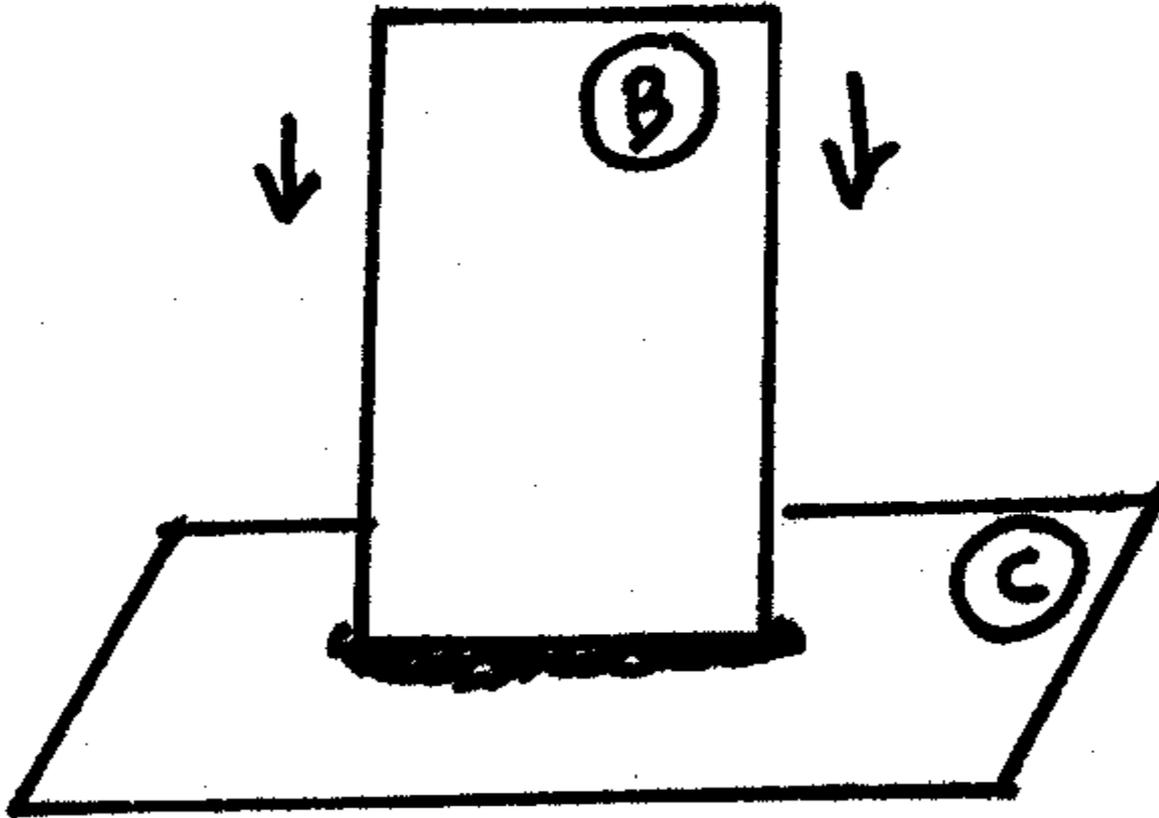
**Fig 7. Put a drop of aspirate on an inclined slide (A)**



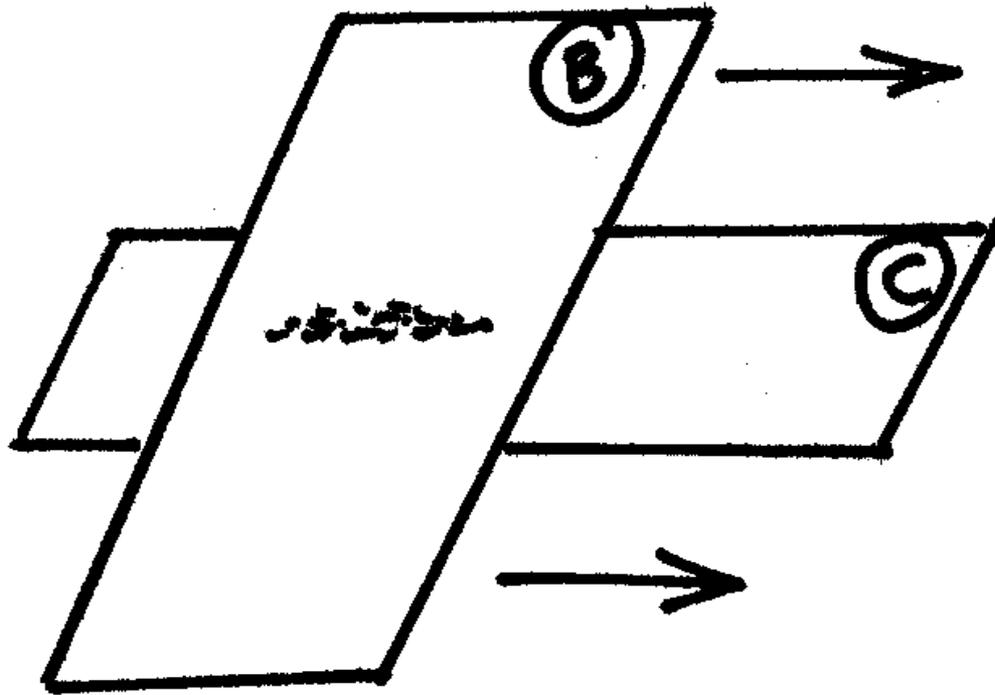
**Fig 8. Pick up spicules with another slide (B) along the lower edge**



**Fig 9. Touch the lower edge of slide (B) on another slide (C) to drop the spicules**



**Fig 10. Put (B) flat on (C), sliding (B) on (C) without much pressure**

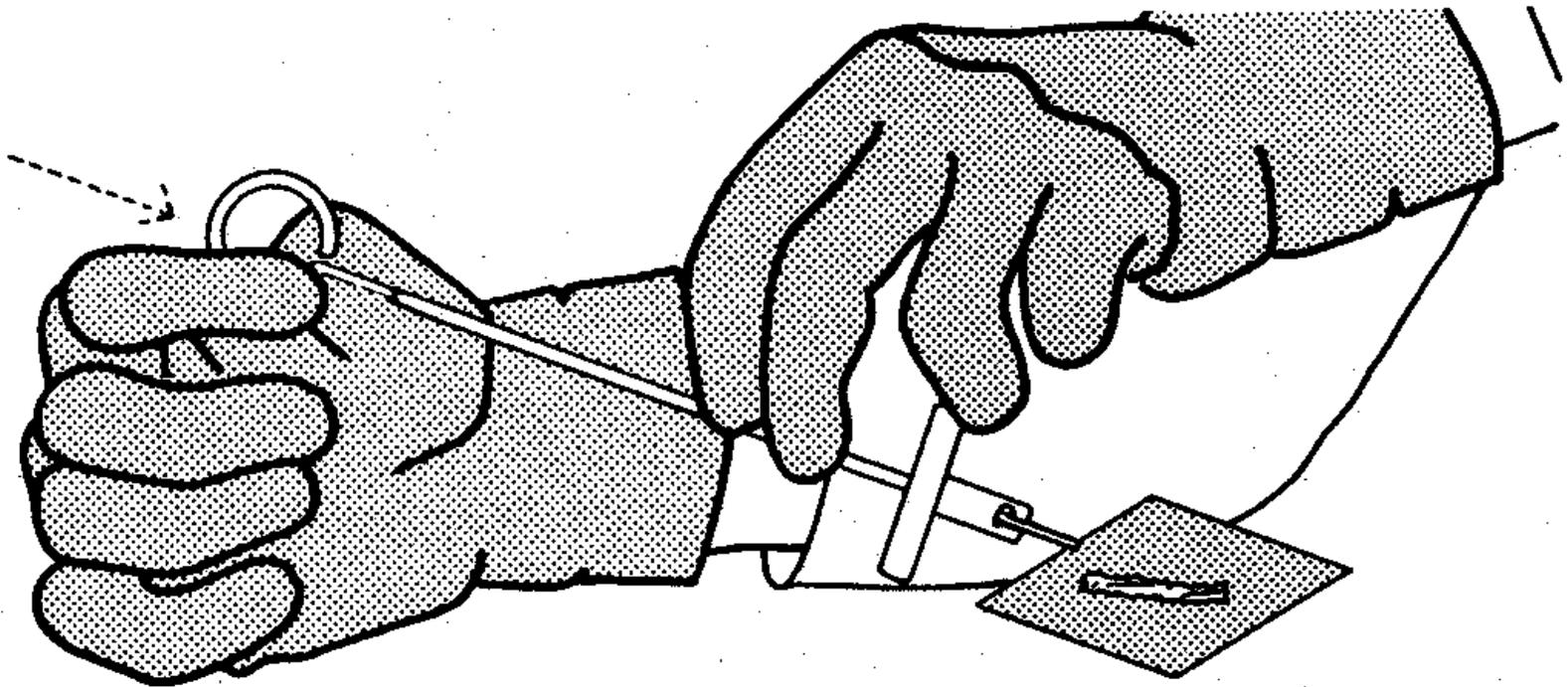


## Steps in procedure (cont'd)



- ⌘ Remove Illinois needle. Insert Jamshidi needle at another site through the same skin incision. Advance the needle until it is seated, take out the obturator. Advance the needle until a measurement of at least 1.0 cm is seen
- ⌘ Rotate the needle clockwise x10, counter-clockwise x 10. Then take it out. Use a stylet (figure 6) to push the biopsy out to a slide

**Fig 6. Pass the stylet through the pointed end toward the hub**



## Steps in procedure (cont'd)



- ⌘ Put pressure on the incision to control bleeding. Clean the site with alcohol, then put a bandage on the incision. Have patient lying on the back for 1-2 hours.
- ⌘ The technologist will make touch preps, then put biopsy in a formalin container
- ⌘ The clot from the aspirate syringe is also removed and put in a formalin container at this time

# Submission of samples (with appropriate forms)



- ⌘ Aspirate, touch preps: hematology lab for Wright stains (slides same day)
- ⌘ Biopsy, clot: histology (slides next day)
- ⌘ Flow: Ben Taub (from LBJ), SW (from Hermann), results 1-2 days
- ⌘ Cytogenetics: Dynagene (results 1 -2 wks)
- ⌘ Micro cultures: in-house lab

# Notes



- ⌘ Jamshidi needles have to be used for both aspirate and biopsy in some obese patient (measure depth of periosteum with lidocaine needle to see if Jamshidi needle is needed for aspirate)
- ⌘ Aspirate must be done before biopsy to prevent clotting
- ⌘ Helpful to learn how to do technologist's work in case of weekend bone marrow

## Notes (cont'd)



- ⌘ Pediatric bone marrow: performed by pediatric hematologist with laboratory technologist support
- ⌘ Need CBC with retic for every bone marrow
- ⌘ Flow/cytogenetics need to be sent as early as possible for cell viability (esp on Fri)
- ⌘ Experience comes with practice

# Difficult cases



- ⌘ HIV(+) patient: if dry-tap after repeated trials-> skip the aspirate, get a long biopsy, use scalpel to cut the biopsy in halves (1 for histology, 1 for culture)
- ⌘ Biopsy can be sent for cytogenetics/flow cytometry in case of dry tap
- ⌘ Procedure with patient in the sitting position
- ⌘ Aspirate that refuses to clot: use thrombin reagent in Hematology