The Biopsy

deceptively simple procedure…

….yet a cognitively complex event!
THE BIOPSY

technique of harvesting a representative sample of tissue without compromising definitive care.
BIOLOGY OF SARCOMAS

**characteristics:**
centripetal growth, most immature part at leading edge (unlike carcinomas, sarcomas do „push“, not infiltrate)

**reactive zone:**
tissue between tumor and surrounding normal tissue (prolif. of mesenchymal cells, neovasculature, and inflammation)

Bickels J et al CORR 368: 1999
**BIOLOGY OF SARCOMAS**

* **satellite lesion:**
  nodules/microextensions of tumor
  (not metastatic phenomenon)

* **skip lesion:**
  nodules outside reactive zone, but within same compartment

Bickels J et al CORR 368: 1999
Carcinoma: from epithel, mesothel forms capsule

Sarcoma: from mesothel, no true capsule
WHEN TO BIOPSY?

Clinical Exam
difficult, because….. think of it!

- pain?
- size?
- depth?
- mobility?
- growth?
- skin changes?
WHEN TO BIOPSY?

Imaging
difficult, because.....rare and non-specific!

needs to be performed before any (invasive) biopsy
HOW TO BIOPSY?

decide before bx about most representative part

→ position the point of entry along planned incision

→ bx tract with shortest way to lesion, without violating more than 1 compartment

→ avoid contamination of
  - neurovascular structures
  - joints
  - bone/other uninvolved structures
HOW TO BIOPSY?

Proximal and Distal Femur

MEDIAL LESIONS

LATERAL LESIONS

PROXIMAL FEMUR

DISTAL FEMUR

Sartorius

Adductor longus

Gracilis

Rectus femoris

Biopsy tract

Vastus lateralis

Biopsy tract

Vastus medialis

T

T
HOW TO BIOPSY?

Proximal Tibia
HOW TO BIOPSY?
Proximal Humerus
HOW (TECHNICALLY) TO BIOPSY?

1.) open Biopsy
   - Incision-Biopsy
   - Excision-Biopsy

2.) trocar biopsy (Needle 14-18G)
   - CT- / US-guided / Im-Int.

3.) Fine needle biopsy (Needle 22-25G)
   (recurrences, metastasis)
Excision-Biopsy:

- small tumors <3-5 cm
  - osteochondroma
  - superficial soft tissue lesion
    - avoid NV contamination
• obvious lesions (when diagnosis is safe clinically and radiologically)

→ Lipoma
→ Ganglion
→ Schwannoma
→ Neurofibroma
**Incision - Biopsy:** suspected sarcomas

- if pathology is inconclusive or
- when there is no correlation between clinic and imaging

*B Bone and soft tissue lesions, Skrzynski et al JBJS 1996*
lager tissue volume

- special studies
- molecular studies
- more precise grading

→ ↓ risk of sampling error
INCISION BIOPSY - DISADVANTAGES

- risk of infection
- risk of fracture
- costs
- tumor spill
  - \(? \uparrow \text{LR}\)
OPEN BIOPSY - TECHNIQUE

• exsanguination by gravity

• use a Tourniquet
plan the biopsy such that it lies in the planned incision of definite surgery
OPEN BIOPSY - TECHNIQUE

- longitudinal
- straight
- short, but adequate
- paralleling muscle below
OPEN BIOPSY - TECHNIQUE

longitudinal
• straight
• short, but adequate
• paralleling muscle below
3 simple rules

1. Do not use a transverse incision
3 simple rules

1. Do not use a transverse incision
2. Do NOT use a transverse incision
3 simple rules

1. Do not use a transverse incision
2. Do NOT use a transverse incision
3. Just don’t do a transverse incision
OPEN BIOPSY - TECHNIQUE

- direct approach
- minimal dissection
- avoid:
  - joints
  - compartments
  - NV structures
OPEN BIOPSY - TECHNIQUE

- bone window*
  - small circular
  - enlarge ovally
  - metaphysis preferred
  - Meticulous hemostasis

*if there is soft tissue part, bone window is usually not necessary

OPEN BIOPSY - TECHNIQUE

- choose the least differentiated part
  - typically the least mineralised part
- use a knife, do not crush tissue

Osteosarcoma
OPEN BIOPSY - TECHNIQUE

Do not shell it out...
OPEN BIOPSY - TECHNIQUE

- don’t crush specimen
- avoid curettes
- keep moist
- give to waiting pathologist
- send fresh
Is it viable?

Is it enough?

Is it representative?
OPEN BIOPSY - TECHNIQUE

- good hemostasis
- Gelfoam or cement
- Drain if necessary
- in line with the incision
OPEN BIOPSY - TECHNIQUE

accomplish your goal, then **STOP!**
RULES FOR THE OPEN BIOPSY

1. smallest longitudinal incision
2. do not squeeze the tissue
3. obtain enough tissue for diagnosis
4. culture what you biopsy, and biopsy what you culture
5. meticulous hemostasis
6. use drains when necessary
The Biopsy…*minimally invasive Biopsies*

multiple samples from different parts are taken
The Biopsy…*minimally invasive Biopsies*

multiple samples from different parts are taken
The Biopsy…*minimally invasive Biopsies*

[Image of a medical scan with annotations]

- supra-patellar pouch
The Biopsy...*minimally invasive Biopsies*

**Femoral Vein**

**MFH Iliopsoas**
The Biopsy…*minimally invasive Biopsies*

Radiation induced sarcoma (MFH) of bone

Proper Location
WHO SHOULD DO THE BIOPSY?

142 pts w. musculoskeletal tumors treated @ one institution during 2002; outcome bx before referral or at treating inst.

- badly performed bx hindered treatment in 38%
- change in definitive treatment in 28%
  (more radical or palliative)

→ outside biopsy = increased risk for
  - incomplete excision requiring reexcision
  - amputation
  - adjuvant RT

Pollock RC et al ANZ J Surg 74:516-9, 2004
Lipomas are removed only for cosmetic reasons not to find out what they are...
A lipoma is a distinct clinical entity diagnosed by physical examination, if it is not a typical lesion, it *needs* to be investigated...
when the lesion is superficial, an excisional biopsy is performed for a suspicious non-lipoma like lesion < 3-5cm.
Every subfascial mass is malignant until proven otherwise by either history, physical examination, imaging or a biopsy...
TAKE HOME MESSAGES

The biopsy is performed only after all of the radiographic images are obtained. The MR is severely compromised by procedural edema...
TAKE HOME MESSAGES

Never make a diagnosis of a *hematoma* in the absence of significant and obvious trauma.
TAKE HOME MESSAGES

Treat what you *know* it is, not what you *think* it is

this is not a benign process...
if your plan is to do a biopsy, just do a biopsy...
„.....if the surgeon or the institution is not prepared to perform accurate diagnostic studies, or proceed with definitive treatment for these patients, then the patients should be referred to a treating center before the biopsy.“
The Biopsy

deceptively simple procedure....

....yet a cognitively complex event!