



# Tips & Tricks: Determinant and Indeterminate Lesions: When is Biopsy Necessary?

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## Case 1

A 23 year old female patient presents with a 5cm x 5cm painful mass in her posterior calf after a collision playing college soccer. It is diagnosed as a resolving hematoma by clinical examination only. She followed up several months later with a persistent soft tissue mass that had slowly increased in size. She then had an excisional biopsy of the lesion through a transverse incision without wide margins. The pathology results were consistent with a myxoid liposarcoma. There was extensive ecchymosis noted after the surgery, so it is presumed that the wound bed and surrounding area is likely contaminated with residual tumor cells.

## Presentation

Although approximately 99% of soft tissue masses are benign (Papp 2007), misdiagnosis of a malignant lesion can lead to potential loss of limb or life. A high suspicion and algorithmic approach must be used to prevent a delay in diagnosis that may affect survival. A patient's history is not enough to confirm the diagnosis in many cases and may be misleading. Many lesions are identified after a traumatic event, although only about half of soft tissue sarcomas are painful (Papp 2007). Additionally, slow growing lesions may be benign, however many malignant lesions are slow growing as well, such as synovial sarcoma. Advanced imaging is required when there is any question of the diagnosis on clinical examination.

## Imaging

XR can be helpful in a small number of soft tissue sarcomas. For example, 30% of synovial sarcomas demonstrate intralesional calcifications. However MRI with and without

contrast is the gold standard for workup of soft tissue masses. Determinant lesions are those that can be diagnosed definitively based on MRI characteristics and do not need a biopsy for confirmation. Indeterminate lesions require a biopsy for diagnosis. All soft tissue sarcomas are indeterminate lesions. Examples of determinant and indeterminate lesions are demonstrated in Table 1.

## Biopsy

A biopsy is required for all indeterminate lesions. In a core needle biopsy, a large bore needle is inserted into the mass and multiple samples are obtained for pathology. Core needle biopsy is the most common method of establishing a diagnosis of indeterminate soft tissue masses. It creates a small tract that may or may not be excised if the definitive pathology is malignant. In general, if an indeterminate soft tissue mass is to be biopsied, it should be ideally done in coordination with the treating orthopaedic oncologist. An open incisional biopsy can be performed if the core needle biopsy fails to obtain adequate tissue or a diagnosis. In this case, a longitudinal biopsy tract is designed that will be excised at the time of definitive resection if malignant. In the case of an incisional biopsy, hemostasis is critical as any local hematoma is considered contaminated.

An excisional biopsy should not be performed for indeterminate lesions. The local recurrence rate is over four times higher in patients after unplanned excisions of sarcomas compared with patients who underwent a planned excision (Potter 2008). Re-resection for residual disease and additional therapy is often needed after unplanned excision of a sarcoma. Additionally, patients with unplanned excisions often require

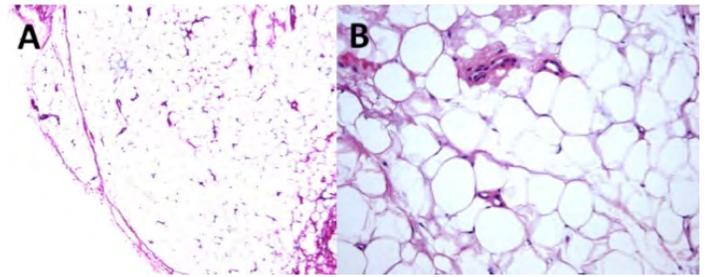
Table 1: Determinant vs. Indeterminate lesions

Determinant Lesion	Indeterminate Lesion
Heterotopic Ossification	Benign solitary fibrous tumor
Lipoma	Intramuscular myxoma
Ganglion cyst	Giant cell tumor of tendon sheath
Hemangioma	Soft tissue sarcoma (Figure 2: C-D)
Neurofibroma	
Muscle tear	
PVNS	



**Figure 1.** A: Axial T2 FS and B: Axial T1 of intramuscular lipoma in anterior thigh. Note homogenous structure that is isointense to fat on both T1 and T2 FS sequences. Compare to C: Coronal STIR and D: Coronal T1 of myxoid liposarcoma in posteromedial calf. Note heterogeneous consistency isointense to adjacent muscle on T1 imaging (images courtesy of Kristy Weber).

more extensive soft tissue reconstruction in the setting of limb salvage surgery (Potter 2008). Although long-term outcomes appear similar in patients with unplanned excisions, it is with potentially greater morbidity to the patient as more extensive therapy and reconstruction are often needed (Smolle 2017).



**Figure 2.** A: Low and B: High power H&E staining of lipoma. Note that sample is comprised almost entirely of fat cells (histology courtesy of Kristy Weber).

## Case 2

A 40 male presents with a well-defined soft tissue mass on the dorsal aspect of his forearm. It has enlarged over the last 3 years and was evaluated for possible excision. Although soft and compressible, an MRI was obtained that demonstrates an intramuscular mass with features isointense to subcutaneous fat on all sequences (Figure 1: A-B). There are no septations or nodularity. A diagnosis of a lipomatous lesion is made and the patient proceeds with an excisional biopsy without complications. The final pathology confirms the diagnosis of a simple intramuscular lipoma (Figure 2).

## References

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