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## Clinical History:

The patient is an 81 year old male who first presented in May 2019 with a sizeable mass on the left anterior thigh, which is grossly visible. The patient states that the mass is not painful and has been growing for the last two years. He has decided to seek medical attention due to his recent significant weight loss and fatigue. Upon palpation the mass is nontender. There is no weakness of the leg, no tingling or neurological defects, and no regional lymphadenopathy. In addition the patient has an extensive medical history including GERD, hypertension, multiple heart surgeries, BPH, hernias, and multiple melanoma excisions from the scalp and left hand in 2015. The patient has no family history of other malignancies or soft tissue masses.

An ultrasound and MRI reveals the mass to be enhancing and located within the vastus medialis muscle, which is highly suspicious for malignancy. Multiple needle core biopsies are performed and a diagnosis of liposarcoma is determined. The patient then undergoes pre-op radiation therapy and a wide excision of the mass is performed in October 2019.



Figure 1: View of left anterior thigh prior to mass removal

TABLE 32-1. RELEVANT CLINICAL HISTORY	
HISTORY RELEVANT TO ALL SPECIMENS	HISTORY RELEVANT FOR SARCOMA SPECIMENS
Organ/tissue resected or biopsied	Location and depth of mass
Purpose of the procedure	Involvement of soft tissue or bone
Gross appearance of the organ/tissue/lesion sampled	Rate of growth (duration of lesion)
Any unusual features of the clinical presentation	Presenting symptoms and signs.
Any unusual features of the gross appearance	Preoperative therapy
Prior surgery/biopsies – results	Family history (e.g., Li-Fraumeni syndrome, familial retinoblastoma syndrome)
Prior malignancy	
Prior treatment (radiation therapy, chemotherapy, drug use that can change the histologic appearance of tissues)	
Compromised immune system	

Figure 2: Important clinical history to consider when evaluating soft tissue tumors

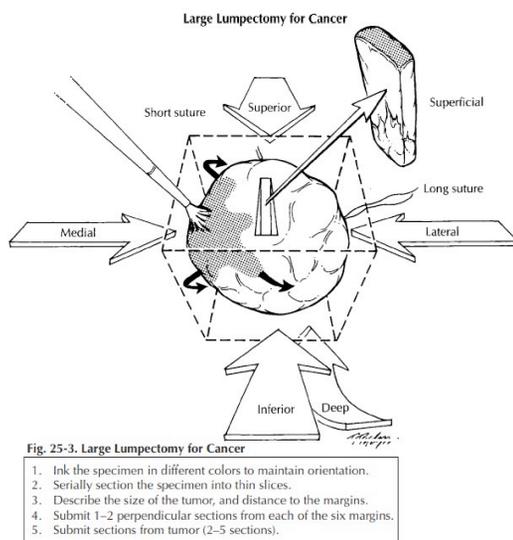


Fig. 25-3. Large Lumpectomy for Cancer

1. Ink the specimen in different colors to maintain orientation.
2. Serially section the specimen into thin slices.
3. Describe the size of the tumor, and distance to the margins.
4. Submit 1-2 perpendicular sections from each of the six margins.
5. Submit sections from tumor (2-5 sections).

Figure 3: Grossing steps for lumpectomy specimens

When grossing soft tissue tumors assessment of the margins is extremely important. The major treatment of soft tissue tumors is wide excision, so complete resection of the tumor with adequate width of margins or uninvolved fascial planes are important determinants of long term outcome. Distance of the tumor from the margins may determine the need for further surgery or post op radiation. There is no defined consensus on what adequate margins for soft tissue tumors are. Among 33 different papers on the topic, the published range runs from “negative for tumor at inked margin” microscopically up to 5cm grossly. Lester says for sarcomas the margins should be 1-2cm or an uninvolved fascial plane.

## Gross Findings:

The specimen received was a large mass with attached soft tissue and skin. Our approach to the specimen was to treat it as a cross between a skin ellipse and a lumpectomy, because we needed to adequately assess all of the large margins and with perpendicular sections. To do this the oriented mass was inked two different colors (medial and lateral halves), and a clock face numbering system was applied. With that system the superior, lateral, inferior, and medial margins were generously sampled with perpendicular sections at each clock number (1-12 o'clock). In addition the anterior and deep/posterior margins were also sampled with numerous perpendicular sections along the length of the specimen from superior to inferior. Heterogeneous areas from the tumor and additional marginal tissue removed by the surgeon were also submitted.



Figure 4: Anterior view of specimen



Figure 5: Posterior view of specimen

1. Evaluate the outer surface for structures present (skin, muscle, bone, nerve, vessels etc) and gross tumor involvement. Measure overall dimensions and those of identifiable structures present. Weigh and ink.
2. Serially section. Describe the lesion including size in three dimensions (very important!), color, borders, necrosis (percent of tumor involved) or hemorrhage, variation in gross appearance, involvement of adjacent structures, and location (skin, subcutaneous tissue, fascia etc).
3. Measure the distance of the tumor to all the margins.
4. Submit perpendicular sections of all margins, tissue from variegated areas within the tumor, and any other anatomical structures present. As a general rule, at least one section per centimeter of the tumor's greatest dimension should be examined. If a patient has had previous neoadjuvant therapy it is important to document the extent of response by submitting an entire representative slice of tumor. If any lymph nodes are present in the surrounding soft tissue they need to be submitted entirely.



Figures 6-7: Cut surface of specimen demonstrating variation in tumor appearance

## Microscopic Findings:

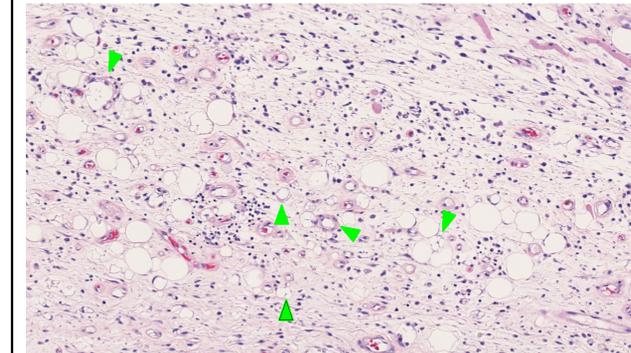


Figure 8: Lipoblasts within the tumor (green arrows)

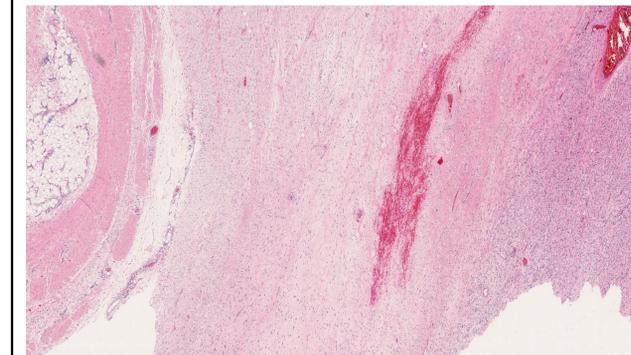


Figure 9: Cellular dedifferentiation within the tumor

The presence of lipoblasts in the tumor corroborates the previous diagnosis of liposarcoma. Lipoblasts are cells with an abundant, clear, multi-vacuolated cytoplasm, and an eccentric, darkly stained nucleus that is indented by the vacuoles. Examples are identified by the green arrows in figure 8. The next step for the pathologist is to determine what type of liposarcoma is present, which will effect the grade of the tumor. In figure 9 it is apparent that the cells change as you move farther into the interior of the tumor. On the left there is normal looking fat with lipoblasts and moving to the right the cells change into a spindle shape with growth patterns resembling those of fibrosarcomas and malignant fibrohistiocytomas. When this cell change is present the tumor is deemed “dedifferentiated”, which automatically gives the tumor a higher grade. For soft tissue tumors there are three grades based upon mitotic activity, necrosis, and differentiation, which are highly correlated with prognosis. In the final report this tumor was deemed to be a stage 3B, grade 3 dedifferentiated liposarcoma.

Type	Estimated frequency (%)	Age at presentation	Typical sites	Behavior	Genetics
ALT/WDLs	>50-60	Middle-aged to old	Retroperitoneum, extremities, trunk wall	Local recurrence and risk of dedifferentiation	12q13-15 MDM2 amplification
Dedifferentiated liposarcoma	15-20	Middle-aged to old	Retroperitoneum, extremities, trunk wall	Risk for metastasis, especially with high-grade dedifferentiation	12q13-15 MDM2 amplification
Myxoid liposarcoma	20-25	Adult, often <40 years, rare in childhood	Thigh, other extremity sites, very rare in retroperitoneum	Recurrence common. Metastatic rate 30-40% in long-term follow-up	t(12;16) with DDIT3-FUS gene fusion
Pleomorphic liposarcoma	<5	Old adults	Extremities, trunk wall	High risk for recurrence and metastasis	Complex, poorly understood

Figure 10: Types of liposarcomas and common features

## References:

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5. Miettinen, M. (2016). Atypical lipomatous tumors and liposarcomas. In M. Miettinen (Ed.), *Modern Soft Tissue Pathology: Tumors and Non-Neoplastic Conditions* (pp. 416-442). Cambridge: Cambridge University Press.