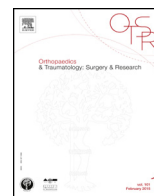




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Original article

## Prognostic factors for the recurrence of myxoid liposarcoma: 20 cases with up to 8 years follow-up



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### ABSTRACT

**Introduction:** Myxoid liposarcomas (MLS) are the second most common type of liposarcoma. Although some MRI findings are distinctively characteristics of MLS, the diagnosis can be tricky in tumors with a large portion of round cells (RC). Known predictors of an unfavorable outcome include age, tumor size, high RC content and positive resection margins. The goal of this retrospective study was to define prognostic factors for recurrence, with special emphasis on the percentage of RCs and medical care provided in a non-specialized center.

**Patients and methods:** Twenty patients (11 women, 9 men) with a mean age of 44.3 years (18–73) were reviewed after a mean of 55.9 months. Six of these patients had been operated at a non-specialized center. The diagnostic MRI was read by a specialized radiologist and the resection procedures performed by two specialized surgeons. Tumors were labeled as either “pure myxoid liposarcoma” or “myxoid/round-cell liposarcoma”. The local recurrence-free survival rate and mortality rate were calculated.

**Results:** Fifteen patients had undergone an MRI during the initial assessment. The typical MRI findings of MLS were present in four of them. The MRI suggested a non-specific lesion in the other 11 patients. After correlation with pathology findings, these tumors contained more than 5% round cells. The fourteen patients treated at our facility had undergone a biopsy, while none of the ones treated outside did. Five patients had R0 resection margins and 15 had R1 margins. Prognostic factors for recurrence consisted of age, tumor size > 10 cm, R1 resection margins, FNCLCC grade 2 + R1 margins, medical care at a non-specialized center, and > 5% round cells. There were eight local recurrences and three metastases (15%). Two patients died (90% overall survival rate).

**Discussion:** The risk of local recurrence was 3.86 times greater in this study when the tumor contained more than 5% RCs, which is consistent with published data. The MLS diagnosis was made only four times based on the initial MRI because misleading nature of high RC tumors. R1 resection margins are a risk factor for local recurrence. However, cases with R1 margins have a recurrence rate that is similar to R0 cases when the surgery is performed at a specialized cancer center. Treatment of MLS in a non-specialized center is a key negative prognostic factor. The reported rate of metastasis varies. Atypical extrapulmonary localizations are common, and often multifocal. MRI has been shown to be superior at detecting secondary lesions and some have suggested that a full-body MRI should be performed.

**Conclusion:** Prognostic factors for the recurrence of myxoid liposarcomas have been identified. MRI analysis is not definitive and must be supplemented by a biopsy.

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### 1. Introduction

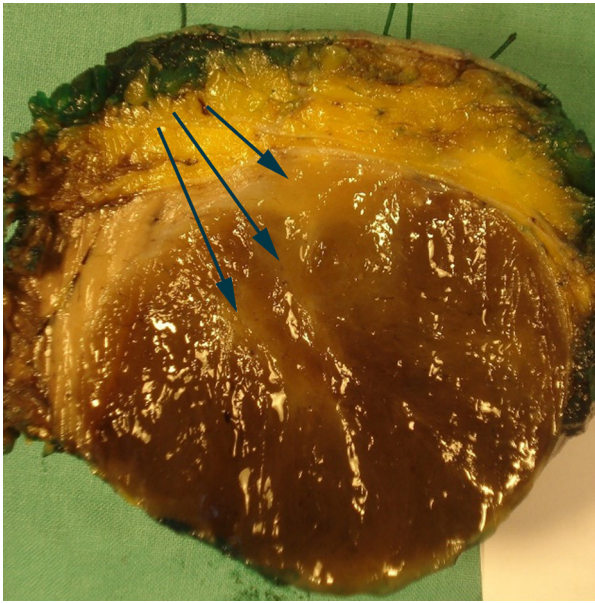
Liposarcomas are soft-tissue tumors in a broader class of mesenchymal tissue neoplasms, which have an adipocyte-derived cell

population. These tumors make up 17–25% of all sarcomas, which have an incidence of 30 cases per million [1,2].

The World Health Organization classification includes five sub-types, including myxoid liposarcomas (MLS) and round-cell liposarcomas (RCLS) [3] (Fig. 1). MLS is the second most common type of liposarcoma. The disease spectrum is consistent with that of other tumor types, ranging from well-differentiated pure liposarcoma to dedifferentiated liposarcoma with high round-cell content [4]. Well-known negative prognostic factors are patient age

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**Fig. 1.** Section through a myxoid liposarcoma after surgical resection showing typical features such as myxoid and gelatinous tissue infiltrated by fat (superior pole and center, arrows).

(>45 years), tumor size (>10 cm), sub-aponeurotic location, high histological grade, large percentage of round cells and positive resection margins [5–7].

Magnetic resonance imaging (MRI) is essential for the diagnosis of liposarcoma [4,8–10]. Although there are disease-specific MRI criteria, the diagnosis can be tricky in tumors containing a large number of round cells [4,10]. Treatment of these lesions requires a multidisciplinary team in a specialized cancer center [11–13]. MLS have the ability to metastasize to other soft tissues, including serous ones, which can make patient monitoring more challenging [5,14,15].

The goal of the current study was to define prognostic factors for local recurrence and metastasis, with special emphasis on the percentage of round cells and treatment at a non-specialized center.

## 2. Patients and methods

A series of 20 patients who were treated surgically for MLS between January 2004 and February 2012 were reviewed retrospectively. Patients were included if they had been referred within our hospital network for consultation and treatment of MLS. Patients who were diagnosed and underwent tumor resection at our facility were included, as were those who underwent an unplanned tumor resection at another facility.

All patients were treated and monitored. Patients who experienced a recurrence during the follow-up period were compared to those who did not. The initial MRI analysis was performed by a single specialized radiologist. All of the surgical procedures were performed by two surgeons who were specialized in the care of adult sarcomas.

The definitive diagnosis was made by a pathologist who specializes in sarcomas. The liposarcomas were labeled as either “pure myxoid liposarcoma (MLS)” or “myxoid/round-cell liposarcoma (MRCLS)”. Histological grading was performed based on the FNCLCC system (French Federation of Comprehensive Cancer Centers). The quality of the surgical resection was defined according to the “R” classification of the Union for International Cancer Control. The need for additional treatment was determined in multidisciplinary

meetings: radiation therapy for R1 tumors or FNCLCC grade 2 or 3 tumors; chemotherapy for metastatic lesions.

The data were analyzed statistically using the XLSTAT® software (Addinsoft S.A.R.L., Paris, France). The local recurrence-free survival time was defined as the period between the initial diagnosis and the date of the last visit. The mortality rate was calculated. Differences between the “local recurrence” and “recurrence-free” groups were analyzed with a Chi<sup>2</sup> test for the qualitative variables and Student’s *t*-test for quantitative variables. A multivariate analysis was carried using a Cox proportional hazards model. Statistical tests where the *P*-value was below 0.05 were considered as being statistically significant. Survival rates were analyzed using Kaplan-Meier curves to determine the risk of local recurrence, metastasis and death.

## 3. Results

The series consists of 20 patients (11 women, 9 men) who were operated for curative purposes between January 2004 and February 2012 (Table 1). The average age was 44.3 years (range 18 to 73). The average follow-up was 55.9 months. The tumor was located in the lower limb in all patients: popliteal fossa in five patients (25%), anterior aspect of thigh and sartorius muscle in four patients (20%), adductor fossa in seven patients (35%) and gluteal area in two patients (10%). The tumor was located in the anterior compartment of the tibia in one patient and was located in the infrapatellar fat pad in one other patient.

Fifteen patients had undergone an MRI during the initial assessment. The disease-specific MRI finding of a homogeneous mass with combined T1 hyposignal and T2 hypersignal and intralesional adipose tissue was present in four patients, all of whom had pure myxoid liposarcomas. In the other patients, the MRI report listed the presence of a non-specific heterogeneous mass with malignant appearance. After correlation with pathology results, these tumors contained more than 5% round cells. The five patients who

**Table 1**  
Summary of study results.

Variable	Value	Percentage (%)
<i>Age</i>		
Average	44.3	
Range	18–73	
<i>Gender</i>		
Male	9	45
Female	11	55
<i>Presentation</i>		
Primary	14	70
Post-resection R2	4	20
Post-recurrence	2	10
<i>Tumor size</i>		
Average	11.675	
Range	2–26	
<i>Biopsy</i>	14	70
CT scan	8	57.1
Surgery	5	35.7
Biopsy/excision	1	7
<i>FNCLCC grade</i>		
Grade 1	11	55
Grade 2	9	45
Grade 3	0	0
<i>“R” Classification</i>		
R0	5	25
R1	15	75
<i>Round cells</i>		
0–5%	5	45
10%	3	27.3
25%	2	18.2
> 25%	1	9.5
<i>Local recurrence</i>	8	40
<i>Metastasis</i>	3	15
<i>Death</i>	2	10

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