Factors Affecting the Diagnostic Delay of Soft Tissue Sarcomas and the Associated Postoperative Complications

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INTRODUCTION: The delay in diagnosis of musculoskeletal oncologic pathology can significantly impact patient care and survival. Shorter delays in diagnosis are thought to improve survival and treatment outcomes in some soft tissue sarcoma patients.[1] The size of musculoskeletal tumors is a significant prognostic factor, with larger tumors estimated to have a greater likelihood of metastasis at presentation, further emphasizing the importance of early detection, diagnosis, and treatment. [2] This project aimed to assess factors affecting the diagnostic delay of soft tissue sarcomas and whether a greater diagnostic delay is associated with metastatic disease, local recurrence, and postoperative complications.

METHODS: This is an IRB-approved retrospective case review of patients treated for a soft tissue sarcoma at a single academic institution between March 2017 and November 2022. Inclusion criteria included a biopsy confirming a primary soft tissue sarcoma and subsequent surgical resection. Exclusion criteria included benign pathology, metastases affecting the soft tissue, inadequate clinical follow-up, or an incomplete medical record. Diagnostic delay was calculated as days between symptom onset and diagnostic biopsy. The reason for the diagnostic delay was assigned to who was responsible for the greatest delay and was divided into three categories: patient delay, provider delay, and healthcare system delay. Presenting symptom was classified as mass, pain, neurologic, or incidental. If patients presented with a mass and another symptom category, they were only classified in the mass category. Patients were divided into four categories based on tumor size at diagnosis: 0 to 4.99 cm, 5 to 9.99 cm, 10 to 14.99 cm, and 15+ cm. Tumor size, postoperative complications, local recurrence, and metastatic disease status were determined using the institution's electronic health record. The clinical variables were analyzed using univariate analysis.

RESULTS SECTION: 77 patients were included in this study. 18 tumors were between 0 and 4.99 cm, 23 between 5 and 9.99 cm, 15 between 10 and 14.99 cm, and 21 greater than 15 cm (Table 1). 75.32% of patients experienced a diagnostic delay greater than 90 days from symptom onset with a median delay of 178 days and an average delay of 485 days (Table 1). Patients were the most common reason for the delay in diagnosis (71.01%) (Table 1). Healthcare providers were responsible for 23.19% of the diagnostic delays (Table 1); PCPs comprised 43.75% of the provider delay and orthopedic providers comprised 33.33%. Most patients presented with a clinically palpable mass (74.03%). 48.05% of patients experienced at least one of the following postoperative complications: infection, re-resection, return to the OR, pain, or wound dehiscence (Table 3). Patients with tumors between 5 and 9.99 cm were significantly more likely to experience local recurrence after resection ($p = 0.004$) (Table 2). Tumors greater than 15 cm had the greatest chance of presenting with or developing metastatic disease (38.10%) (Table 2).

DISCUSSION: While diagnostic delay is multifactorial, patients appear to be the primary reason for delay. Tumors between 5 and 9.99 cm have a significantly greater chance of local recurrence after initial resection. More work must be done on a state and national level to educate patients on seeking medical care for a clinically palpable mass, especially those larger than 5 cm (the length of a AA battery). Medical providers should receive more education on the importance of referring suspicious soft tissue masses to orthopedic oncologists, preventing further delays in diagnosis. Limitations of this study include the typical disadvantages of a retrospective review study. The patients in our analysis were obtained from a single tertiary referral hospital's electronic health record within an urban medical center in a single state. Further studies should evaluate the factors affecting the diagnostic delay of soft tissue sarcomas and the associated postoperative complications.

SIGNIFICANCE/CLINICAL RELEVANCE: This study emphasizes the importance of increased patient and provider education to mitigate diagnostic delays for soft tissue sarcomas.

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IMAGES AND TABLES:

	# of Patients	Median/Avg Delay	% ≥ 90 Days	% Patient Delay	% Provider Delay	% HCS Delay
Overall	77	178 / 485	75.32%	71.01%	23.19%	5.80%
0 – 4.99 cm	18	154 / 413	66.67%	86.67%	6.67%	6.67%
5 – 9.99 cm	23	178 / 445	73.91%	75.00%	25.00%	5.00%
10 – 14.99 cm	15	179 / 423	73.33%	61.54%	38.46%	0.00%
15+ cm	21	175 / 634	85.71%	66.67%	18.32%	9.52%

Table 1: Diagnostic Delay and Reasons for Delay

	% Mass	% Pain	% Neurologic	% Incidental	% Recurrence	% Metastatic
Overall	74.03%	16.88%	2.60%	6.49%	20.78%	28.57%
0 – 4.99 cm	72.22%	16.67%	5.56%	5.56%	0.00%	11.11%
5 – 9.99 cm	69.57%	21.74%	0.00%	8.70%	43.48%	30.43%
10 – 14.99 cm	80.00%	13.33%	0.00%	6.67%	20.00%	33.33%
15+ cm	76.19%	14.29%	4.76%	4.76%	14.29%	38.10%

Table 2: Presenting Symptoms, Local Recurrence, and Metastatic Disease

	% Complications*	% Infection*	% Re-resection*	% Return to OR*	% Pain*	% Dehiscence*
Overall	48.05	25.98	20.78	20.77	11.69	9.09
0 – 4.99 cm	61.11	38.89	33.34	22.22	11.11	11.11
5 – 9.99 cm	56.52	30.44	30.44	26.09	13.04	8.70
10 – 14.99 cm	21.74	13.34	6.67	13.34	13.33	0.00
15+ cm	33.33	19.05	9.52	19.05	9.52	14.29

Table 3: Postoperative Complications *(sub-categories listed as total rate compared to all patients, not those with complications)