

Time to Functional Outcome Optimization after Musculoskeletal Tumor Resection

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BACKGROUND

- The Musculoskeletal Tumor Society Evaluation (MSTS score) is a validated tool for evaluating a patient's functional status after treatment of benign and malignant bone and soft tissue tumors.¹⁻⁴
- There is limited published evidence for the length of time it takes patients to reach their optimized score after surgical treatment of musculoskeletal tumors, particularly benign tumors.

OBJECTIVES

- Determine the length of time it takes for patients' MSTS scores to optimize after surgical treatment for benign and malignant bone and soft tissue tumors.
- Evaluate tumor and patient characteristics that could influence time to optimization of MSTS functional outcome scores after surgical treatment for bone and soft tissue tumors.

METHODS

- A retrospective review was performed on all patients surgically treated for a musculoskeletal tumor by a single surgeon from April 2016 through May 2021.
- Patients' MSTS scores were assessed at each of their post-operative visits.
- Scores were considered optimized if they did not change over two consecutive visits or if they reached the maximum score of 30.
- Several factors were assessed for association with time to optimization including patient age, sex, diabetes, anxiety or depression, tobacco use, BMI, tumor type (bone vs. soft tissue), tumor malignancy (malignant vs. benign), tumor location (upper extremity, lower extremity, trunk), adjuvant chemotherapy or radiation treatment, depth of tumor for soft tissue tumors in relation to investing muscular fascia, and type of surgery for bone tumors.

RESULTS

- 187 patients met inclusion criteria.
- The average MSTS optimized score was 29.1 (Percent score of 97%).
- 82% of the population (N=154) achieved the maximum possible score of 30

Figure 1. Time to MSTS score optimization (N=187)

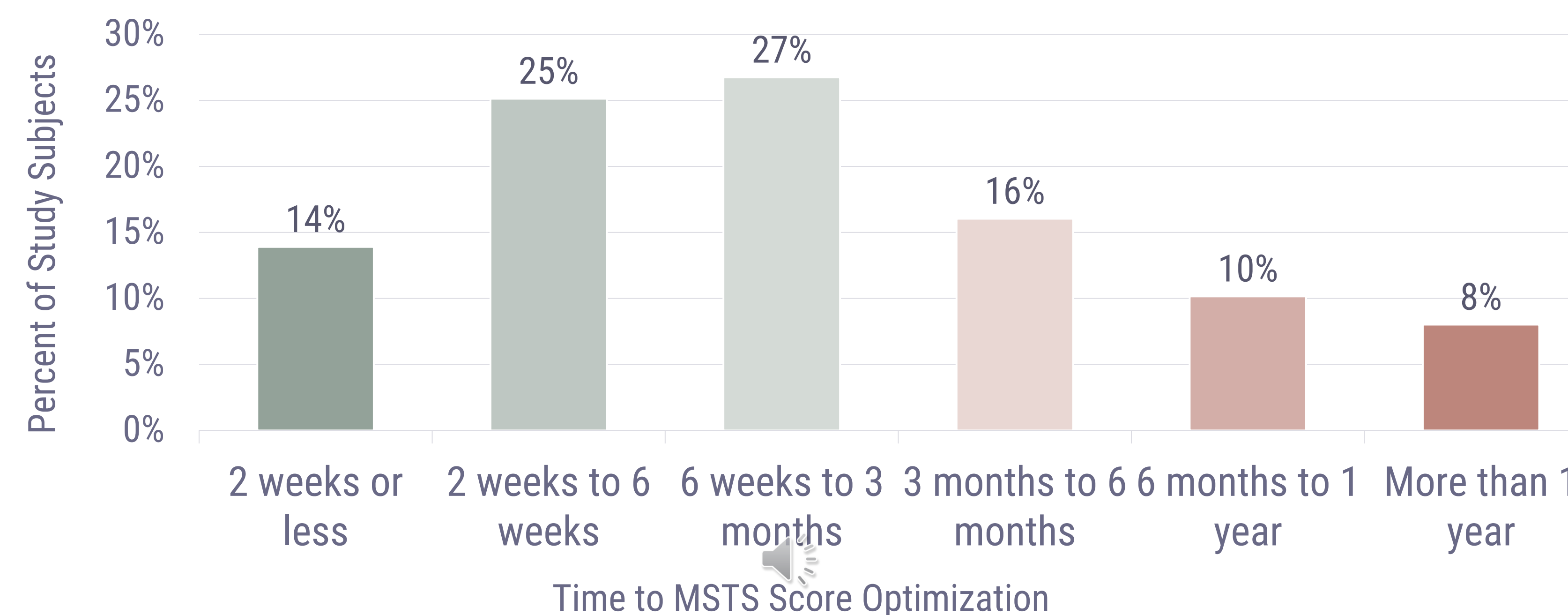


Table 1. Days to score optimization

	N	Average Days to Score Optimization (SD)	Median Days to Score Optimization (IQR)	P-value ^a
All patients	187	112 (143)	50 (37-139)	-
Bone vs Soft Tissue				
Bone	58	164 (180)	93 (54-174)	<0.001
Soft Tissue	129	89 (116)	43 (20-92)	
Site				
Upper Extremity	60	95 (107)	45 (75-117)	Ref
Lower Extremity	117	123 (157)	64 (36-149)	0.24
Trunk	10	93 (163)	47 (42-50)	0.67
Benign vs Malignant				
Benign	131	88 (134)	43 (25 -86)	<0.001
Malignant	56	170 (147)	119 (76-212)	
Treatment				
Radiation and/or chemo	29	151 (128)	89 (56-201)	0.02
No radiation or chemo	158	105 (145)	46 (35-111)	
Bone Tumors: Type of Procedure				
Resection alone	36	141 (141)	92 (52-172)	0.30
All other procedures ^b	22	202 (229)	119 (76-255)	
Soft Tissue Tumors: Superficial vs Deep				
Superficial	48	76 (133)	41 (15-47)	0.03
Deep	81	97 (105)	48 (36-111)	
Soft Tissue Tumors: Bony Work				
Had bony work	10	166 (125)	133 (82-209)	0.004
No bony work	119	83 (113)	42 (198-85)	

^a From linear regression, predicting days to score optimization, which was log-transformed to uphold model assumptions. Models were adjusted for diabetes status and tobacco use at the time of surgery.
^b Other^b includes resection with fixation (N=7), resection with reconstruction (N=5), fixation alone (N=7), curettage resection (N=2), and amputation (N=1).

CONCLUSIONS

- Median time to MSTS score optimization was 50 days, which falls between the 6 week to 3 month follow up appointment, and mean time to score optimization was 112 days, which falls between the 3 and 6 month follow up appointments.
- The majority of the population (66%) achieved their optimized score within 3 months, 26% achieved their optimized score within 3 months to 1 year, and 8% took more than 1 year to achieve their optimized score.
- Bone tumors, malignant tumors, adjuvant treatment with chemotherapy and/or radiation, deep soft tissue tumors, and bony work for soft tissue tumors significantly prolonged time to functional optimization (Table 1).
- Tobacco use was the only patient variable found to influence time to score optimization. Surprisingly, it was associated with shorter optimization times. However, a larger percentage of tobacco users had benign soft tissue tumors which was independently found to have shorter times to optimization and may explain this finding.
- The majority of patients undergoing surgery for musculoskeletal tumors can be counseled that they can expect maximum recovery within one year, unless they have risk factors associated with a longer recovery as stated above.

FUTURE IMPLICATIONS

- Multicenter studies are needed to increase the sample size enough to allow for the evaluation of recovery times for specific tumor types.

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