Outcomes of pediatric and adolescent patients with metastatic sarcoma treated with surgical resection or stereotactic ablative radiation therapy (SABR)

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INTRODUCTION

Metastasis-directed therapy (MDT) such as surgery (Sx) or stereotactic ablative radiation therapy (SABR) is sometimes used in carefully selected pediatric and adolescent patients with metastatic sarcoma. However, such local therapies may be associated with toxicities. There is a paucity of literature on the outcomes of local control and toxicity of MDT for metastatic sarcoma in children and adolescents.

AIM

To determine the local recurrence (LR) and complication rates for surgical resection and SABR for metastatic sites in pediatric and adolescent patients with sarcomas

METHOD

- A single institution retrospective-review of pediatric and adolescent patients (less than age 25) diagnosed with new or recurrent metastatic sarcoma and treated with SABR or surgery between 2009 – 2020 was conducted.
- Intracranial metastases were excluded.
- LR was defined as tumor recurrence at surgical site or within the planning target volume of SABR for each treatment course.
- Local failure free survival (LFFS) was defined as time from treatment course to either death or LR
- Toxicity was defined as per the National Cancer Institute Common Terminology Criteria for Adverse Events Version 5 (NCI-CTCAE)

RESULTS

- 17 patients with median age of 18 years and follow up of 1.9 years
- 168 metastatic lesions treated with 32 courses of radiotherapy and 35 resections.
- Most common site of treatment by SABR was bone (23/32 lesions) and by Sx was lung (32/25)
- SABR median equivalent dose in 2Gy fraction was 88Gy
- 8 (23%) LRs in Sx and 6 (19%) LRs in SABR subset
- 2-year LFFS was 56±10% and 57±12.8% for the surgery and SABR subsets respectively (Figure 1)
- Median OS from time of diagnosis and MDT was 7.2 and 2.2 years
- Toxicity:
  - SABR: 1 grade 2 and 1 grade 3 toxicity
  - Sx: 1 grade 3 toxicity
  - No other grade 2 or higher complications recorded.

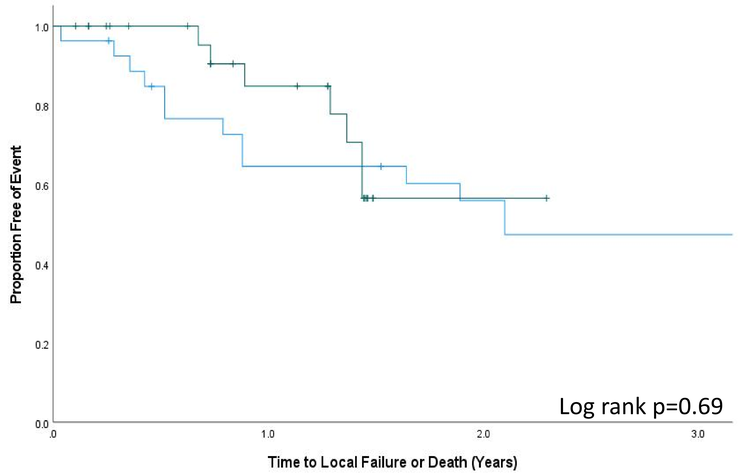
Table 1. Demographic and disease characteristics by patient

	Sx only (n=12)	RT only (n=1)	Both (n=4)
Median age (range)	18 (4 – 24)	18	21 (19 – 25)
Gender (%)			
Female	5 (42%)	1	4 (100%)
Male	7 (58%)	0	0
ECOG by first treatment (%)			
0	3 (25%)	0	3 (75%)
1	4 (33%)	0	1 (25%)
2	2 (17%)	0	0
Missing	3 (25%)	1	0
Histology (%)			
Synovial sarcoma	3 (25%)	0	1 (25%)
Osteosarcoma	4 (33%)	1	2 (50%)
Rhabdomyosarcoma/Ewing	2 (17%)	0	0
Others	3 (25%)	0	1 (25%)
Median number of lesions (range)	1 (1 -4)	17	1.5 (1 – 3)

Table 2. Univariate cox regression analysis for local failure free Survival (LFFS)

Variables	UVA		
	HR	95% CI	P value
Age	1.08	0.95 – 1.20	0.24
Gender			
Male vs Female	1.19	0.43 – 3.29	0.74
ECOG			
0 (reference)	NA	NA	NA
1	0.86	0.17 – 4.32	0.17
2	3.39	0.82 – 14.00	0.82
Treatment			
Sx vs SABR	1.21	0.46 – 3.20	0.69
Histology			
Synovial (reference)	NA	NA	NA
Osteosarcoma	11.57	2.15 – 62.36	**0.004**
Others	0.81	0.15 – 4.41	0.80
Location of lesion			
Lung (reference)	NA	NA	NA
Soft tissue/LN	1.17	0.15 – 9.26	0.88
Bone	1.26	0.48 – 3.29	0.64
EQD2 (RT only)	0.95	0.90 – 0.99	**0.04**

Figure 1. Local Failure Free Survival (LFFS) of the Patients Treated with Surgical Resection (Blue) and Stereotactic Radiotherapy (Black) for Metastasis



CONCLUSIONS

- MDT with surgical resection or SABR may be safe and effective in providing local control for pediatric and adolescent patients with metastatic sarcoma
- MDT for osteosarcoma and lower RT dose may be associated with worse local control
- Further analysis with a larger cohort and longer follow-up to identify factors associated with LR and histology-specific therapy is needed to optimize care for these patients.

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