

Histologic and Radiologic Characteristics of Pulmonary Metastases from Sarcoma

Harmange C, Muniappan A, Mathisen D, Mitchell J

Department of Thoracic Surgery, Massachusetts General Hospital, Boston, MA, USA

INTRODUCTION

- Sarcoma is a rare heterogenous disease that most commonly metastasizes to the lungs^{1,2}
- Pulmonary metastasectomy is the only effective treatment to date in those with localized and resectable disease³⁻⁵
- Pulmonary metastases have a poor prognosis, with a 5-year survival rate of less than 20%, even after complete resection⁶
- Growth patterns of pulmonary metastases are unique and different from the primary sarcoma due to the nature of pulmonary tissue⁷
- Certain growth patterns of pulmonary metastases have been identified such as presence of interstitial growth, size of metastases, and pleural penetration⁸⁻¹⁰
- Radiologic findings have also been described such as presence of cavitation, calcification, and hemorrhage^{8,9}
- With over 70 distinct subtypes of sarcoma, no comprehensive comparison of radiologic and histologic features of pulmonary metastases from individual subtypes exists
- Given that resection is the best treatment option, histologic and radiologic features are important in determining resection margins and surgical approach

PURPOSE

The purpose of this study is to define the radiologic and histologic characteristics of pulmonary metastases from individual sarcoma subtypes and their prognostic implications.

HYPOTHESIS

We hypothesize that each of the sarcoma subtypes will exhibit different radiologic and histologic characteristics which will have implications in prognosis and pulmonary metastasectomies.

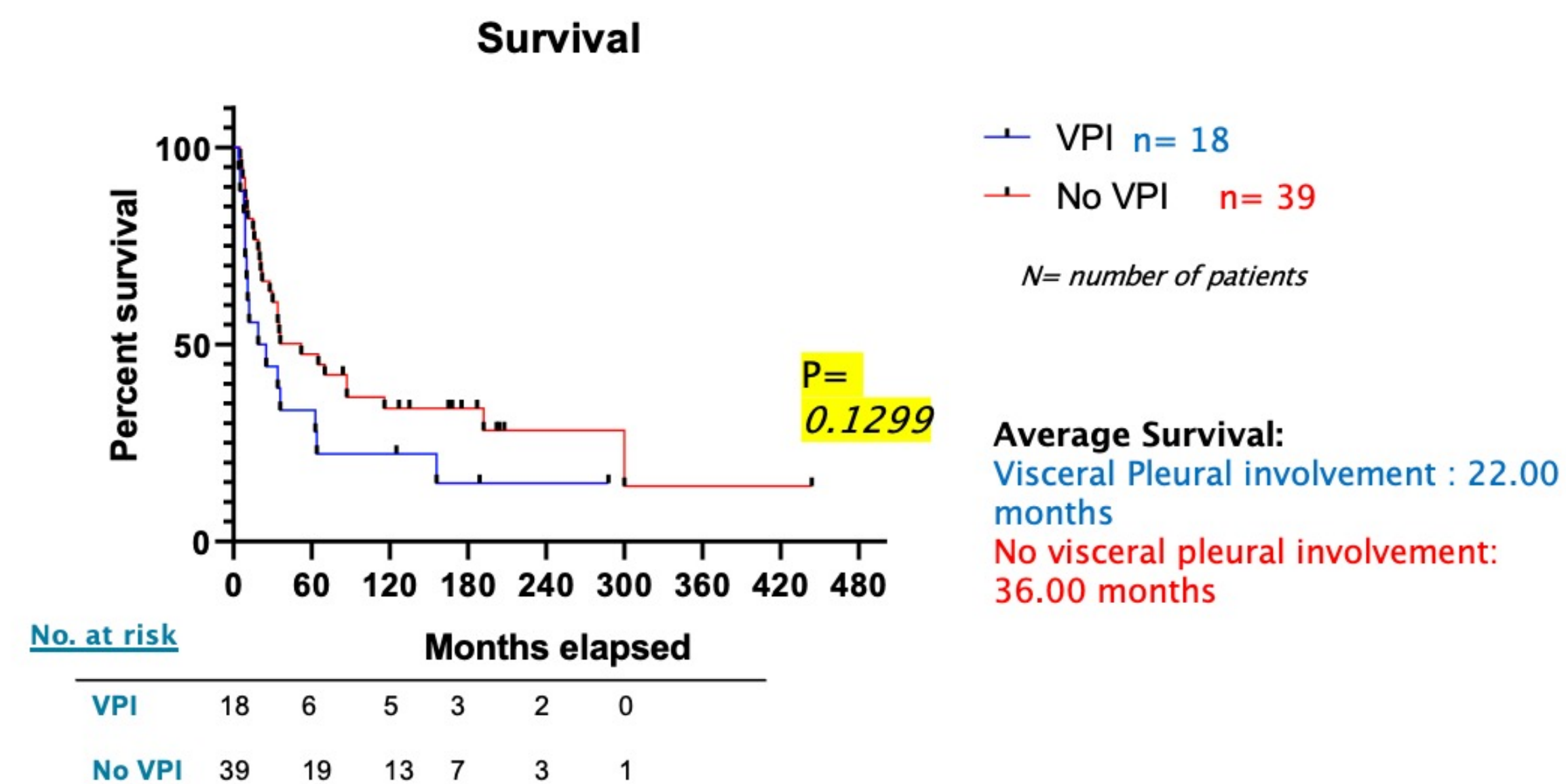
METHODS

- Retrospective chart review
- Included all patients undergoing pulmonary metastasectomy for sarcoma metastases to the lungs at MGH between January 1992 to May 2019
- Clinical variables included histologic subtypes, disease free interval, resection margins
- Radiologic variables included size of tumor, # of nodules, cavitation, smooth borders, pleural abutment, ground glass halo, calcification
- Pathologic variables included spread through airway spaces (STAS), satellite nodules, visceral pleural invasion, perivascular growth, blood vessel invasion, cavitation
- Main outcomes: disease-free interval (DFI), survival, recurrence

PRELIMINARY RESULTS

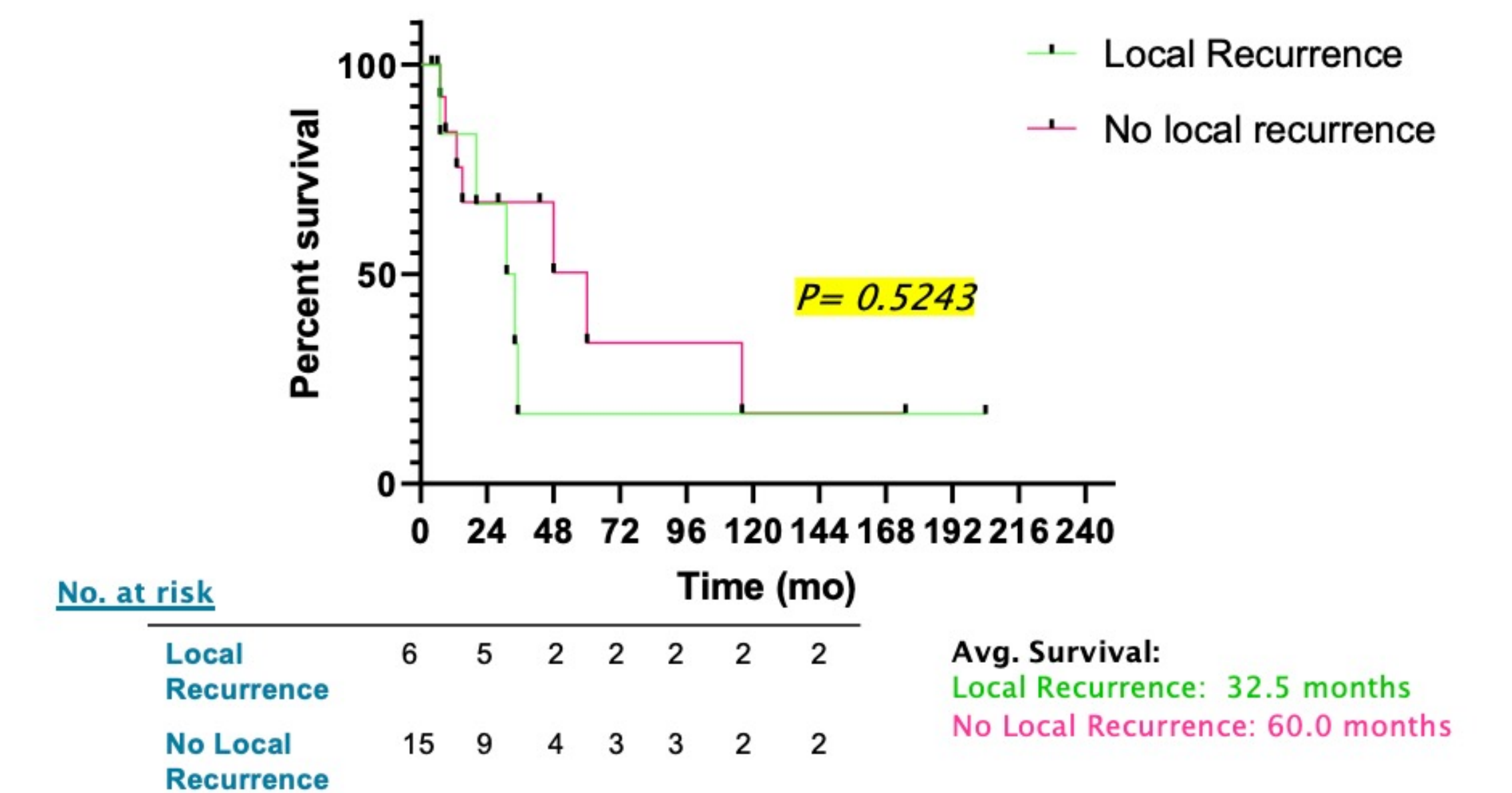
- 471 pulmonary metastasectomies for sarcoma identified
- Results include 71 cases = 57 patients

Average Survival in patients with and without VPI

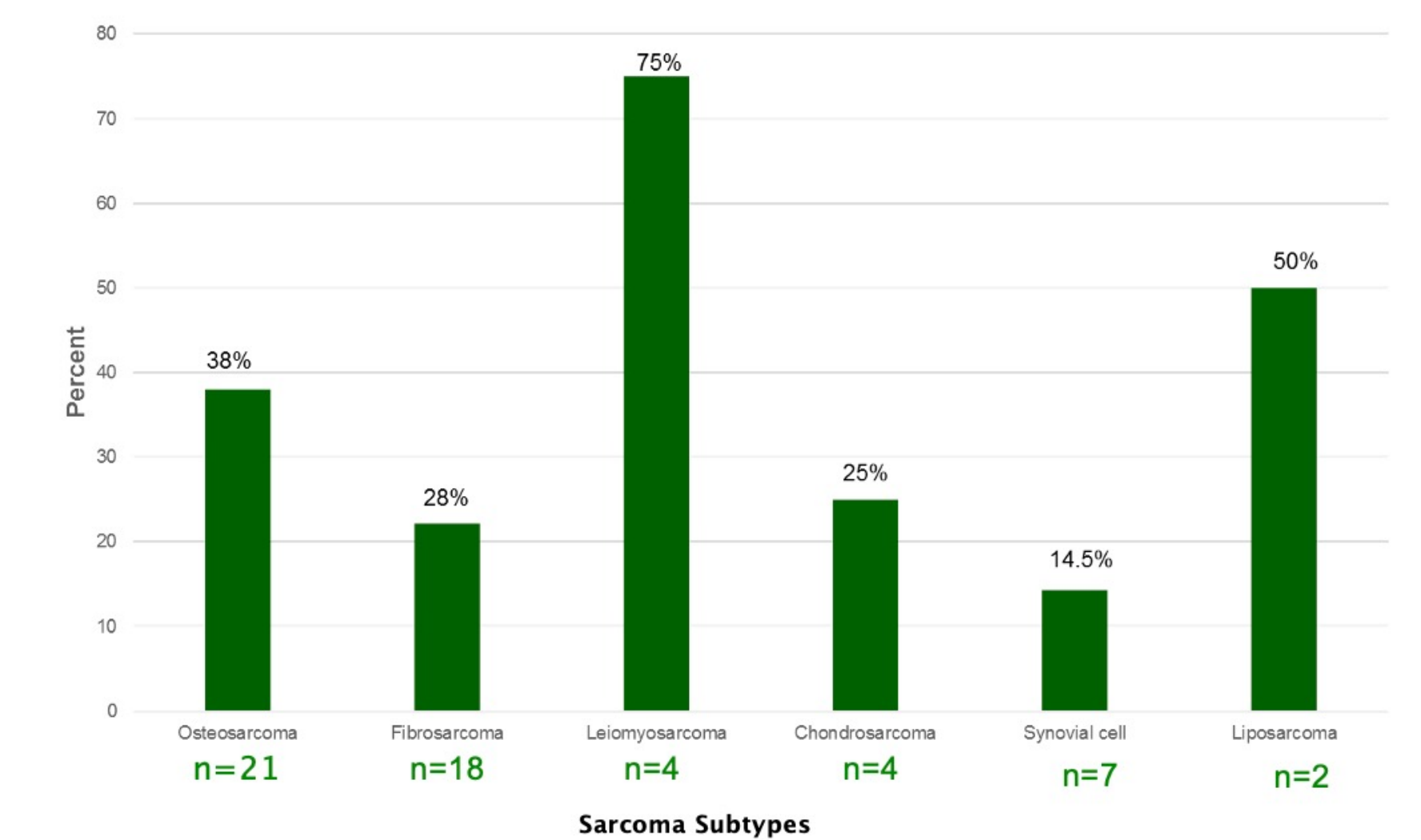


PRELIMINARY RESULTS

Overall Survival in patients with and without local recurrence



Nodules with Pleural Abutment by Sarcoma Subtype



CONCLUSIONS

- Different sarcoma subtypes may have different radiologic and histologic features
- Such factors could play an important role in determining patient prognosis, risk of recurrence and help in the discussion of treatment options
- Limitations** : small sample size therefore all results are preliminary only

REFERENCES

- Pulmonary metastases from soft tissue sarcoma-Analysis of patterns of disease and post-metastasis survival', Billingsley KG, et al. Annals of Surgery 1999;229:602-612
- Metastatic patterns of soft-tissue sarcoma' Verzerdis MP, et al. Archives of Surgery 1983;118:915-918.
- Metastasectomy for soft-tissue sarcoma – further evidence for efficacy and prognostic indicators', Jablons D, et al. Journal of Thoracic and Cardiovascular Surgery 1989;97:695-705
- Analysis of prognostic factors in patients undergoing resection of pulmonary metastases from soft tissue sarcomas' Putnam JB et al. Journal of Thoracic and Cardiovascular surgery 1984; 87:260-268
- Pulmonary metastasectomy for sarcoma-survival and prognostic analysis', Dudek W et al. Journal of Thoracic Disease 2019; 11:3368-3376.
- Factors associated with actual long-term survival following soft tissue sarcoma pulmonary metastasectomy', Smith R, et al. EJSO 2009;35(4):356-361
- Welter, S., Arfanis, E., Christoph, D., Hager, T., Roesel, C., Aigner, C., . . . Theegarten, D. (2017). Growth patterns of pulmonary metastases: Should we adjust resection techniques to primary histology and size?+. *European Journal of Cardio-Thoracic Surgery*,52(1), 39-46. doi:10.1093/ejcts/ezx063
- Pulmonary Resection of Metastatic Sarcoma: Prognostic Factors Associated With Improved Outcomes; Kim, S, et al. The Annals of Thoracic Surgery 2011;92(5):1780-1787 (2011).
- Growth patterns of lung metastases from sarcoma: Prognostic and surgical implications from histology', Welter, S, et al. Interactive CardioVascular and Thoracic Surgery 2012,15(4), 612-617.
- Interstitial growth as an aggressive growth pattern in primary lung cancer', Suzuki S et al. Journal of cancer research and clinical oncology 2016;142:1591-1598