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Introduction

Resection of spinal tumors can greatly improve the quality of life for metastatic disease and facilitate cure of primary spine tumors.

With the rise in healthcare costs there is increasing effort to maximize the value of care provided. Unplanned hospital readmissions are costly and may not be reimbursed in the future.

Baseline rates from high volume centers are necessary to help establish quality standards. This study investigates readmission rates and risk factors for readmission after spine surgery for neoplastic disease.

Methods

Retrospective single-center study design
Included patients received surgical resection and spine stabilization for primary or metastatic tumor of the spine between 2005 and 2011. Patients were grouped by primary or metastatic tumor, with metastatic tumors being subdivided by Tokuhashi primary site subscore (0=worst prognosis, 5=best prognosis):

0 – lung, osteosarcoma, stomach, bladder, esophagus, pancreas
1 – liver, gallbladder, unidentified
2 – other cancers
3 – kidney, uterus
4 – rectum
5 – thyroid, breast, prostate, carcinoid tumor)

Primary outcome was unplanned hospital readmission within one year of discharge from the primary surgery. Planned hospital readmissions (i.e. chemotherapy) were not included in calculating readmissions. Secondary outcomes included analyses for causes and risk factors of unplanned hospital readmissions.
Readmission rates were calculated using Kaplan-Meier time-to-failure analysis. Risk factors were assessed using a cox proportional hazards model.

Demographics

	Primary	Metastatic
Total	39	146
Malignant (%)	69% (n=28)	100% (n=146)
Age (years)	54.1	57.7
Female (%)	52.6%	44.2%
Most common tumor biology		
#1	Chordoma (47%)	Breast (17%)
#2	Hemangioma (18%)	Prostate (15%)
#3	Chondrosarcoma (13%)	Renal Cell Carcinoma (15%)

Results

185 patients included
-39 with primary tumors
-146 with metastatic tumors

The one-year readmission rate estimate was 21.1% (n=8) for primary patients and 32.0% (n=47) for metastatic patients (Figure 1a, p = 0.014). Readmissions related to spine surgery accounted for 70.1% (n=39) of readmissions. Metastatic tumors with a worse Takahashi primary site subscore showed higher readmissions (Figure 1b, p = 0.002).

1-Year Readmission Rates
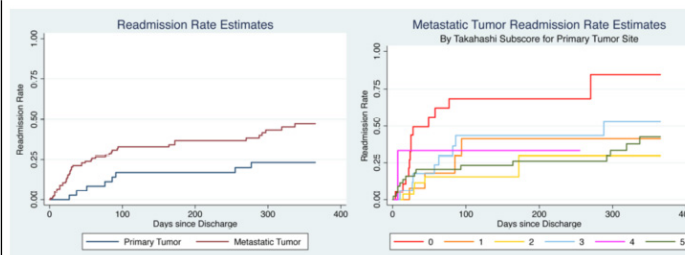
Kaplan-Meier readmission rates (left) for primary vs. metastatic tumor of the spine and (right) grouped by Tokuhashi subscore for primary site of tumor.

Risk of Readmission by Tumor Type

	Hazard Ratio	P-value	95% CI
Tokuhashi Group (vs. primary tumors)			
0	10.3	< 0.001	3.9 - 26.9
1	2.8	0.099	0.8 - 9.4
2	1.5	0.457	0.5 - 4.3
3	3.6	0.011	1.3 - 9.8
4	3.0	0.308	0.4 - 24.1
5	2.1	0.099	0.9 – 5.0

Risk of readmission (hazard ratio) by tumor biology (Tokuhashi primary site group). Lower scores were associated with higher risk of readmission.

Conclusions

Treatment of metastatic and malignant disease of the spine is associated with relatively high unplanned readmission rates. Additionally, site of primary tumor was associated with readmission rate; highly aggressive tumors (lung, osteosarcoma, stomach, bladder, esophagus, and pancreas) had the highest readmission rate. This information may be useful in setting baseline quality metrics and counseling patients and their families.

Learning Objectives

1) Describe the unplanned readmission rates for treating patients with primary and metastatic spine tumor
2) Discuss, in small groups, the important role physicians have in helping to shape health policy standards
3) Identify high-risk patients for unplanned readmission by identifying pertinent risk factors

References

1. Klimo, P., Jr. and M.H. Schmidt, Surgical management of spinal metastases. Oncologist, 2004. 9(2): p. 188-96.
2. Laufer, I., et al., Repeat decompression surgery for recurrent spinal metastases. J Neurosurg Spine, 2010. 13(1): p. 109-15.
3. Padalkar, P. and B. Tow, Predictors of survival in surgically treated patients of spinal metastasis. Indian J Orthop, 2011. 45(4): p. 307-13.
4. Quan, G.M., et al., Surgery improves pain, function and quality of life in patients with spinal metastases: a prospective study on 118 patients. Eur Spine J, 2011. 20(11): p. 1970-8.
5. Tokuhashi, Y., et al., A revised scoring system for preoperative evaluation of metastatic spine tumor prognosis. Spine (Phila Pa 1976), 2005. 30(19): p. 2186-91.