

Introduction

Surgery for spinal metastasis is burdened by a high perioperative complication rate documented in as many as 76% of patients with reported short-term mortality of 10–15%.

The decision to bring a patient into surgery and the extension of the surgery itself must take into account the numerous aspects of the patient’s general health condition, drawing the most accurate risk/benefit ratio.

The purpose of this study is to use a large national registry to evaluate 30-day incidence and main risk factors for complications following surgery for spinal metastasis in the neurosurgical practice.

Methods

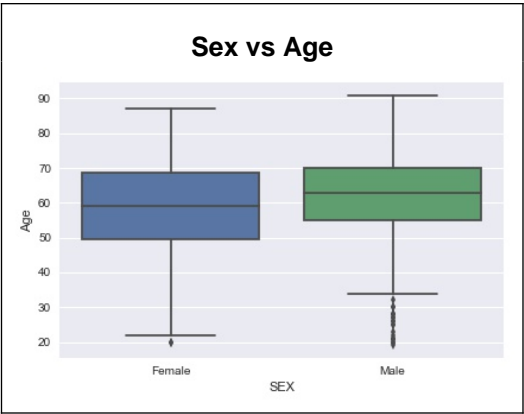
Data were extracted from the National Surgical Quality Improvement Program (NSQIP) registry for patients who underwent surgery for spinal metastases in the neurosurgical environment between 2005 and 2015.

The incidence of major and minor complications (neurological, cardiovascular, renal, infective) was extracted. The variables screened included age, sex, American Society of Anesthesiologists (ASA) class, comorbidities, preoperative functional status and preoperative laboratory values, smoking status.

The Fisher exact test was used to compute the odds ratio, p value and confidence intervals between each variable subgroup and the reference. A p value < 0.05 was considered to determine statistical significance.

Results

A total of 620 patients were included in the study. 61.9% were males with a mean age of 61.4 (IQR 55 – 70), 48.1% were females with a mean age of 58.9 years (IQR 48.5 – 69.5).



The overall thirty-day post-operative mortality was 10.8 %. The most common major complications recorded were: deep venous thrombosis (4.8%), sepsis (2%), and unplanned reintubation (2%).

Table 1. Factors associated to major complications

Feature	Subcategory	No (Major)	Yes (Major)	OR	C.I. 95%	p value
AgeGroup	Lower (<53)	150	12	1		1
	Second (53-62)	141	15	1.32	0.6 - 2.93	0.54
	Third (62-69)	135	18	1.66	0.77 - 3.58	0.24
	Upper (>69)	127	22	2.16	1.03 - 4.54	0.04
Dyspnea	At rest	11	3	2.53		0.57
	Moderate	33	9	2.52		0.03
	Independent	485	50	1		1
Func Status	Partially Dependent	61	16	2.54	1.36 - 4.74	0.005
	Totally Dependent	5	1	1.94	0.22 - 16.93	0.44
	Alk Ph	<147	317	47	1	1
Spine Level	>147	105	5	0.32	0.12 - 0.82	0.013
	Cervical	76	18	1		1
	Lumbar/Sacral	89	8	0.37	0.15 - 0.92	0.03
	Thoracic	360	36	0.42	0.22 - 0.78	0.009

Factors presenting greater associated risk for developing minor complications included: ASA class 3-5, disseminated cancer, dyspnea, partially dependent functional status, pre-operative albumin<3.5 g/dl, pre-operative hematocrit<36%, preoperative sodium<135 mEq/L, and preoperative weight loss (p<0.05). (Table 2)

Among the subgroup of minor complications the most frequent resulted: unplanned blood transfusions(30%), followed by pneumonia (4.3%) and urinary tract infection (3.2%).

Factors with associated risk for major complications included: age>69, dyspnea, partially dependent functional status, and preoperative alkaline phosphatase<147 IU/L (p<0.05). (Table 1)

Table 2. Factors associated to minor complications

Feature	Subcategory	No (Minor)	Yes (Minor)	OR	C.I. 95%
ASA	1-2	62	18	1	
	3	252	154	2.10	1.2 - 3.69
	4-5	76	57	2.58	1.37 - 4.83
Disseminated	1	308	199	1.78	1.13 - 2.81
Dyspnea	AT REST	8	6	1.36	0.46 - 3.98
	MODERATE EXERTION	19	23	2.20	1.17 - 4.14
Func Status	Independent	345	190	1	
	Partially Dependent	40	37	1.67	1.03 - 2.71
	Totally Dependent	4	2	0.90	0.16 - 5
Location	Extradural	288	198	1	
	Intradural Extramedullary	47	13	0.40	0.21 - 0.76
Albumin	Intradural	17	10	0.85	0.38 - 1.90
	<3.5	105	92	1	
HCT	>3.5	187	93	0.56	0.39 - 0.82
	<36	149	148	1	
Sodium	>36	239	81	0.34	0.24 - 0.47
	<135	87	77	1.74	1.20 - 2.49
Transf	>135	294	150	1	
	1	7	17	4.39	1.79 - 10.77
Weight loss	1	27	27	1.81	1.02 - 3.15

Conclusions

The spectrum of risk factors for short-term post-operative complications associated to surgery for spinal metastasis in the neurosurgical practice is wide. It includes some general risk factors as: older age, respiratory problems, lower than optimal funtional status. Some factors are peculiar to the field: thoraco-lumbar and sacral involvement as well as intradural extramedullary location were associated to lower risk Interestingly a higher alkaline phosphatase level seemed to be protective against minor complications, and patients in a partially dependent status seemed to be at greater risk for major complications compared to those in a totally dependent condition

References

Karhade A. Thirty-day readmission and reoperation after surgery for spinal tumors: a National Surgical Quality Improvement Program analysis. Neurosurg Focus Volume 41, August 2016  
Lau D. Independent predictors of complication following surgery for spinal metastasis Eur Spine J (2013) 22:1402–1407