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CLINICAL PREDICTIVE SCORE FOR SURVIVAL IN SPINAL METASTASIS

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ABSTRACT **BACKGROUND:** Approximately 70% of all cancer patients have spinal metastasis. Different scoring system fails to accurately prognosticate such cases due to diverse factors responsible for their survival.

OBJECTIVE: To validate various scoring system in predicting 6 month survival outcomes among spinal metastasis cases and to determine other variable that may co relate with their poor survival.

METHODS AND MATERIALS: 1 year observational study of spinal metastasis (operative + non operative) cases within age group 30-80 years. Patients who lost follow up were excluded. Clinical, laboratory and imaging data collected. NESMS, Revised Tokuhashi and Tomita scoring done and followed up over a period of 6 month for two end points death or survival. The six month survival outcome for different spinal metastasis score were visually assessed using Kaplan- Meir curves.

RESULTS: 26 cases who were followed up for at least 6 months from the time of diagnosis. 15 cases (57.69%) were operated. 6 month mortality is 53.38%. Mean age of presentation 57.65 years. M: F= 38:62. Most common primary was Carcinoma Lung. NESMS of 0 had 100% 6 month mortality. Similarly 70% 6 month mortality was seen in Revised Tokuhashi score 0-8 and 75% 6 month mortality in Tomita score of more than or equal to 8. Visceral metastasis (71.42%) and poor KPS (Mean= 57.14) was seen in patients having poor 6 month mortality. Most common site of visceral metastasis is Lung. CONCLUSION: Thus this study validates NESMS, Revised Tokuhashi and Tomita scoring system and independent variables like visceral metastasis and poor KPS in determining 6 month mortality

KEYWORDS : Spinal metastasis, NESMS, Revised Tokuhashi, Tomita

INTRODUCTION

Spinal metastasis is quite common around 70% of all cancer patients had spinal metastasis at some point in their life (1,2) Due to the increased mortality and poor survival outcomes in such patient's surgeons should estimate the risk and benefit of the patients undergoing any spinal interventions (2,3). Although several scoring systems are in place for prognostication of such patients but no prospective studies exists in validating their accuracy (4,5,6,7). Surgery in spinal metastasis is indicated in radio resistant tumours, neural compression, refractory pain, spinal instability or failure of radiotherapy(8,9,10,11). Prediction of life expectancy in spinal metastasis cases is difficult because various factors determine survival in these patients (12,13,14,15,16). Thus our study was an attempt to validate any such scoring system which may accurately predict the survival outcomes in such patients accurately.

Table 1: New England Spinal Metastasis Score

NESMS Characteristics	Points assigned
1. Modified Bauer Score	
No visceral metastases (1 point)	-
Primary tumor is not lung cancer (1 point)	-
Primary tumor is breast, renal, lymphoma or myeloma (1 Point)	-
Single skeletal metastasis (1 point)	0
Modified Bauer Score ≤2	2
Modified Bauer Score ≥3	
2. Ambulatory function	
Dependent ambulator/nonambulatory	0
Independent ambulator	1
3. Serum albumin	
<3.5 g/dL	0
≥3.5g/dL	1

Table 2: Revised Tokuashi Score

Prognosis parameter	Score
Patient condition	
Poor (performance status 10%–40%)	0
Moderate (performance status 50%–70%)	1
Good (performance status 80%–100%)	2
No. of bone metastases outside spine	
> 2	0
1–2	1
0	2
Metastasis to major organs	
Nonremovable	0
Removable	1
None	2
Primary site	
Lung, osteosarcoma, stomach, bladder, esophagus, pancreas	0
Liver, gallbladder, unidentified	1
Other	2
Kidney, uterus	3
Rectum	4
Thyroid, breast, prostate, carcinoid tumour	5
Palsy	
Complete (Frankel A, B)	0
Incomplete (Frankel C, D)	1
None (Frankel E)	2

Table 3: Tomita Score

Prognosis parameter	Score
Primary site	
Slow growth (breast, thyroid,etc.)	1
Moderate growth (kidney,uterus, etc.)	2
Rapid growth (lung, stomach,etc.)	4
Visceral metastases	
None	0
Treatable	2
Not treatable	4
Bone metastasis	
Solitary	1
Multiple	2

MATERIALS AND METHODS

The aims and objectives of the study were

1) To validate the New England Spinal Metastasis Score (NESMS), Revised Tokuhashi and Tomita score in predicting the 6 month survival outcomes among the spinal metastasis cases treated at our institute
2) To determine any other variable that may co relate with poor survival in spinal metastasis

We did an observational study of all spinal metastasis cases treated at our institute in between 1st Oct 2019 to 31st Nov 2020. The patient were followed up for at least 6 months from the time of diagnosis. Inclusion criteria: All cases of spinal metastasis (operative + non operative). Age group 30-80 years. Exclusion criteria: Patient < 30 years of age and > 80 years old and patients who lost follow-up. Patients with spinal

metastasis were examined and clinical, Laboratory data, Neuroimagings and PET scan details were collected. We scored each patient with New England Spinal metastasis score (NESMS), Revised Tokuashi and Tomita score. Patients were then followed up for 6 months period for two endpoints: death or survival. In the end we tried to co relate the 6 months mortality in such patients with their scoring. We also tried to determine any independent variable that may be related to poor survivality in such patients. The 6 months outcome was visually represented by Kaplein Meir curves. All the statistical analysis was done by SPSS 26.0.

RESULTS

A total of 26 cases were treated out of which 15 cases (57.6%) were operated. Criteria for surgery were neural compression, spinal instability. Rest 11 cases were managed conservatively either with pharmacotherapy or radiotherapy. 14 patients (53.8%) expired at the end of 6 months. Female constituted majority (n=16). Cases ranged from 38 -72 years (Mean age 57.65 years). Most common Primary tumour was Lung Carcinoma (n=10) followed by Carcinoma Breast (n=5), Carcinoma Thyroid (n=3), Multiple myeloma (n=2), CA Oral cavity (n=1), other carcinoma like CA Prostrate and CUO (n=5). Most common site of metastasis Lung (n=7), Liver (n=6) and Brain (n=1).Most of the patients presented with Pain (n=20), Weakness (n=12), Cauda equina (n=1). Bladder was involved in 9 patients. Most common vertebral segment involved was Lower dorsal (D9-D12) n=12, followed by Lumbar and upper dorsal (D1-D4) n=8, Mid Dorsal (D5-D8) n=7, Cervical (n= 5) and sacral (n=2).

Table 4: Results

Total Cases	n= 26
Operated	15
Conservative	11
6 month Mortality	14 (53.8%)
M:F	1:2
Mean age	57.65 years
Primary	Ca Lung 10
	Ca Breast 5
	CaThyroid 3
	Multiple Myeloma 2
	Ca Oral cavity 1
	Others 5
Visceral Metastasis	Lung 7
	Liver 6
	Brain 1
Clinical Presentation	Pain 20 Quadriparesis 3 Paraparesis 9 Cauda Equina 1 Bladder involvement 9
Vertebral segments involved	Cervical (C5-C7) 5 Upper Dorsal (D1-D4) 8 Mid Dorsal (D5-D8) 7 Lower Dorsal (D9-D12) 12 Lumbar 8 Sacral 2

Table 5: 6 Months Mortality And Survivality Of Nesms (new England Spinal Metastasis Score), Revised Tokuashi And Tomita Score

NESMS	6 MONTH MORTALITY
0	9 (64.2%)
1	4 (28.5%)
2	1(7.1%)
3	0
4	0
REVISED TOKUASHI	6 MONTH MORTALITY
0-8	7 (50%)
9 TO 11	6 (42.8%)
12 TO 15	1 (7.1%)
TOMITA	6 MONTH SURVIVAL
9 to 10	1 (8.3%)
7 to 8	2 (16.6%)
4 to 6	5 (41.6%)
0-3	3 (25%)

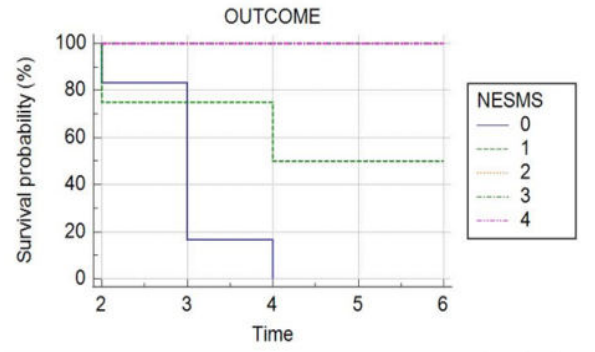

Figure 1: Kaplein Meir Curve Of Nesms Showing 6 Months Survivality Outcome

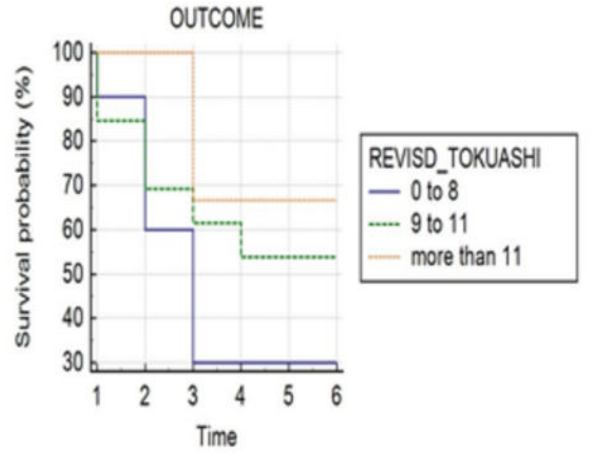

Figure 2: Kaplein Meir Curve Of Revised Tokuashi Showing 6 Months Survivality Outcome

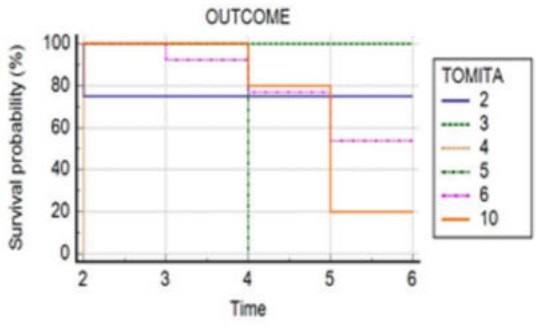

Figure 3: Kaplein Meir Curve Of Tomita Showing 6 Months Survivality Outcome

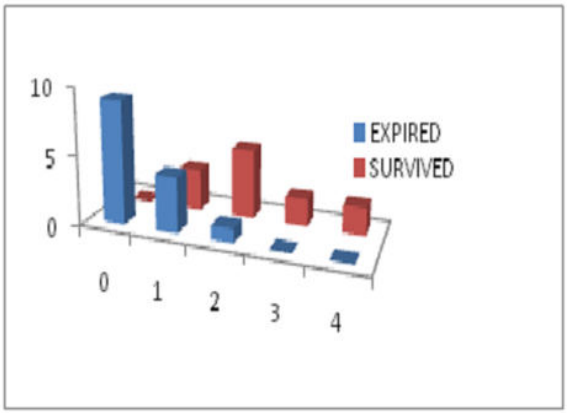

Figure 4: Bar Diagram Showing Distribution Of Expired And Survived Cases In Nesms

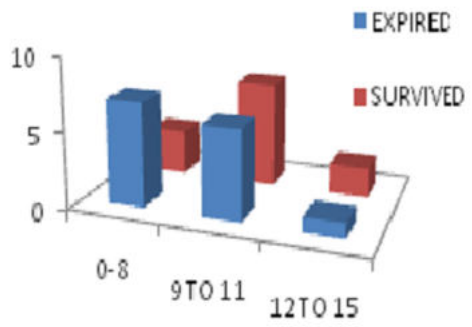

Figure 5: Bar Diagram Showing Distribution Of Expired And Survived Cases In Revised Tokuashi Score

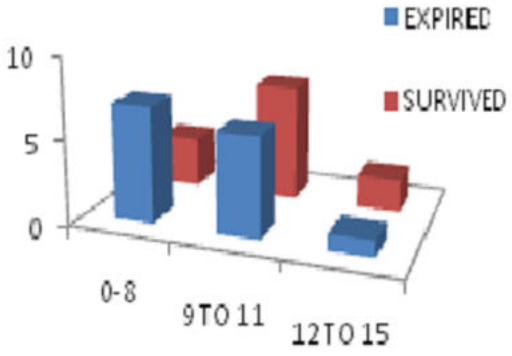

Figure 6: Bar Diagram Showing Distribution Of Expired And Survived Cases In Tomita Score

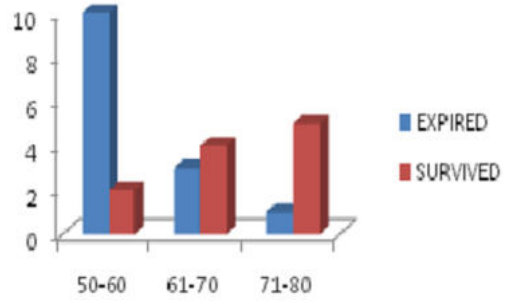

Figure 7: Bar Diagram Representation Showing Distribution Of Expired And Survived Cases According To Kps

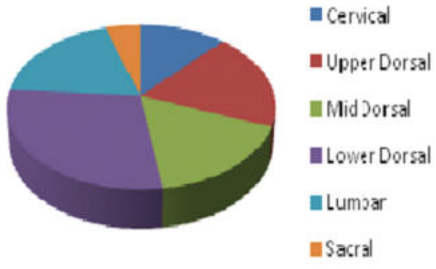

Figure 8: Pie chart representation of spinal segments involved by metastasis

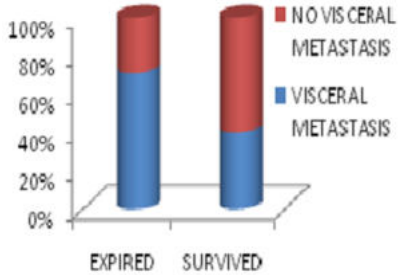

Figure 9: Diagrammatic Representation Of Expired And Survived Cases Depending Upon Presence Of Visceral Metastasis

DISCUSSION

In other prospective studies(17) male preponderance was seen in spinal metastasis (3:2) whereas in our study incidence were more among female this could be due proportionately higher female Lung Ca and breast carcinoma cases in our study. However the age mean age distribution is similar as most of the cases occurred in 5th decade (17). Our 6 month mortality is lower (53.84%) as compared to a prospective study of 180 patients (18) (65%) this may be due to early detection of cancers at our institute. Although Breast cancer is the most common cause of spinal metastasis (19) and also the Report from National Cancer Registry of India 2020 (20) suggest Breast cancer as the commonest cancer in India followed by Lung but we found Spinal metastasis more among Lung cancer patient probable explanation could be due to early detection and advance treatment in breast cancer patients such patients gets cured and do not progress to stage IV disease. In a metaanalysis of 18 studies published in 2020 involving 5468 participants visceral metastasis was found as an independent significant prognostic factor(21) our study also had 71.4 % (n=10) mortality among patients with visceral metastasis. Majority of our patients presented with pain 76.9% and most common site of spinal metastasis is lower dorsal vertebra D7-D12 (26.92%) which is similar to other literatures(22). In a study of 445 patients of spinal metastasis found KPS score of 80-100 to be significantly associated with better survivavility (23) we also found better 6 month survival among higher KPS score (>60) 81.8%. Our study showed 100% 6 months mortality in NESMS score of 0 which conforms to other similar studies where high mortality was found among poor NESMS score (18). Revised Tokuashi score of 0-8 showed 70% mortality in our study which corresponds a retrospective study of 128 spinal metastasis patients in 2014 where they reported 71% mortality among patients who survived less than 6 months had a score of 8 (24). Patients with Tomita score of 0-3 had 75% 6 months survivality in our study which is lower than 90.9% survivality in the study done in 2011(22). This could be due to more number of multiple spinal metastasis cases in our study resulting in over scoring.

CONCLUSION

Our study thus validates different spinal metastasis scoring systems like NESMS, Revised Tokuhashi and Tomita. We also found poor KPS score and presence of visceral metastasis to be frequently associated with poor 6 month survivality among spinal metastasis patients.

DISCLOSURE: No disclosure to be made.
CONFLICT OF INTEREST: None

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