The role of *modified Glasgow prognostic score* in prognosing the life expectancy figures of osteosarcoma patient at general hospital H. Adam Malik

Andriandi[a] , David Kalim[b]

[a] *andriandimd@outlook.com*
[a]Consultant at Orthopaedic and Traumatology Department at H. Adam Malik General Hospital, Bunga Lau 17, Medan, 20136, Indonesia
[b]*Resident of Orthopaedic and Traumatology Department at H. Adam Malik General Hospital, Bunga Lau 17, Medan, 20136, Indonesia*

Abstract

Introduction:
Osteosarcoma is a malignant neoplasm originating from poorly differentiated cells in the metaphyseal area long bones of children, with a 5-year survival rate below 20%. The evaluation of patient's prognosis with osteosarcoma using the modified Glasgow Prognostic Score (mGPS) determine the albumin and C-Reactive Protein values to assess inflammation of a tissue. The mGPS scores are 0,1,2 with the higher the score the worse the prognosis. Researchers want to know the role of mGPS in osteosarcoma patients and the prognosis of life expectancy in a general hospital.
Material and Method:
A retrospective cohort study with a population of osteosarcoma patients at General Hospital H. Adam Malik Medan, which was examined for albumin and C-Reactive Protein (CRP). Using the total sampling method, patients' data was obtained through hospital medical records from January 2012 to December 2017 and a mGPS assessment (0,1,2) was recorded. Then a follow-up was carried out recording patients who were found to survive at >2 years and >5 years.
Results:
There were 34 patients, of which 26(76%) were male and 8(24%) were female. With the highest age group in the 2nd decade (n=20, 59%) followed by the 3rd decade (n=6, 17%) and the 1st decade (n=5, 15%). The predilection for tumor location was often the same in the distal femur and proximal tibia (n=12, 35%) followed by the proximal humerus (n=5, 15%), and proximal femur (n=4, 12%). Meanwhile, the number of patients based on the mGPS 0-2 value was overal the same (n=11-12, 32-36%). In the 2-year survival rate group (p=0.033), there were 9 (45.0%), 7 (35.0%), and 4 (20.0%) patients with mGPS scores of 0, 1, and 2. Meanwhile, there were 5 (71.4%), 2 (28.6%), and 0 (0.0%) patients with mGPS scores of 0, 1 and 2 in the 5-year survival rate group (p=0.009).
Conclusion:
Based on the results of data analysis, it was found that there was a significant relationship (p <0.05) between the mGPS assessment and the patient's life expectancy in 2 years and 5 years.

Keywords: osteosarcoma; mGOS; prognosis; mortality rate

Introduction

Osteosarcoma, also called osteogenic sarcoma, is a malignant neoplasm originating from primitive cells (poorly differentiated cells) in the metaphyseal area of long bones in children. It is called osteogenic because it develops from the osteoblastic series of primitive mesenchymal cells. Osteosarcoma is the most common primary neoplasm of bone. Although osteosarcomas were once usually fatal, advances in treatment have dramatically improved the prognosis for these neoplasms.

Life expectancy for 5 years period in osteosarcoma cases is below 20%. History of surgical therapy in cases of osteosarcoma is amputation / disarticulation. Ablation surgery (amputation / disarticulation) will not provide

a cure in most patients, but the presence of chemotherapy provides a role in increasing the survival of osteosarcoma patients. Along with chemotherapy and appropriate surgical procedures, life expectancy increases.[1,2]

Chemotherapy for the treatment of osteosarcoma can increase life expectancy up to 50%. With the advancement of chemotherapy, preoperative chemotherapy in osteosarcoma patients provides a significant 5-year survival rate ranging from 50% to 75%.[2]

One of the ways to evaluate the prognosis of patients with osteosarcoma is to use scoring, like the modified Glasgow Prognostic Score (mGPS) using values of albumin and C-Reactive Protein to assess inflammation. mGPS is a modification of the previous GPS assessment because the assessment of albumin alone cannot be used as a reference without the value of CRP as an inflammatory factor. The score that can be achieved with mGPS is 0, 1, 2, and the higher the score, the worse the prognosis. This modification is considered better in describing the prognosis in patients with sarcomas than the previous scoring system. mGPS is generally used for the assessment of a soft tissue sarcoma but research on dense tissue such as bone has not been done much.

Based on this background and the knowledge of the researcher, there has been no writing on the role of mGPS in prognosing the life expectancy of osteosarcoma patients at Haji Adam Malik General Hospital Medan.

Method

This study is an observational analytic study with a retrospective cohort approach that aims to determine the role of the modified Glasgow Prognostic Score in prognosing the life expectancy of osteosarcoma patients at Haji Adam Malik General Hospital. Data were obtained from hospital medical records.

Results

All data were processed and presented in tabular form which was divided based on the research objectives into 1) Gender of patients with osteosarcoma, 2) Age group of patients with osteosarcoma, 3) Predilection for osteosarcoma, 4) Number of osteosarcoma patients based on mGPS score, 5) Number of osteosarcoma patients surviving >2 years and >5 years.

Table 1. Gender of patients with osteosarcoma

Gender	N (%)
Male	26 (76%)
Female	8 (24%)

Table 2. Age group of patients with osteosarcoma

Age group (decade)	N (%)
1	5 (15%)
2	20 (59%)
3	6 (17%)
4	2 (6%)
5	1 (3%)

Table 3. Predilection for osteosarcoma

Location	N (%)

Distal femur	12 (35%)
Proximal tibia	12 (35%)
Proximal humerus	5 (15%)
Proximal femur	4 (12%)
Fibula	1 (3%)

Table 4. Number of osteosarcoma patients based on mGPS score

mGPS score	N (%)
0	11 (32%)
1	12 (36%)
2	11 (32%)

Table 5. Number of osteosarcoma patients surviving >2-years and >5-years

mGPS score	N (%)	Life expectancy >2 years, N (%)	Life expectancy >5 years, N (%)
0	11	9 (82%)	5 (45%)
1	12	7 (58%)	2 (17%)
2	11	4 (36%)	0 (0%)

Table 6. Chi-Square test between mGPS score and 2-years survival rate

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.693[a]	2	.096
Likelihood ratio	4.917	2	.086
Linear-by-linear association	4.554	1	.033
N of valid cases	34		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 4.53.

Table 7. Chi-Square test between mGPS score and 5-years survival rate

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.125[a]	2	.028
Likelihood ratio	8.603	2	.014
Linear-by-linear association	6.746	1	.009
N of valid cases	34		

a. 3 cells (50.0%) have expected count less than 5. The minimum expected count is 2.26.

Initially, the Chi-Square test was used to determine the relationship between the mGPS score and the 2-year and 5-year survival rate (Table 6, Table 7). However, both of the tables did not meet the Chi-Square criteria because in each table there was more than 20% of cells with an expected count of less than 5. For the tables that did not meet the Chi-Square criteria, the Mann-Whitney test then used to determine relationship between mGPS score and 2-year survival rate and 5-year survival rate.

Table 8. Mann-Whitney test between mGPS score and 2-years survival rate

		mGPS						P value
		0		1		2		
		n	%	n	%	n	%	
2-Years Survival Rate	YES	9	45,0	7	35,0	4	20,0	0,033
	NO	2	14,3	5	35,7	7	50,0	
Total		11	29,7	12	35,3	11	35,0	

Table 8. Mann-Whitney test between mGPS score and 5-years survival rate

		mGPS						P value
		0		1		2		
		n	%	n	%	n	%	
5-Years Survival Rate	YES	5	71,4	2	28,6	0	0,0	0,009
	NO	6	22,2	10	37,0	11	40,8	
Total		11	46,8	12	32,8	11	20,4	

Table 6 and 7 showed the results of the analysis of the relationship between mGPS scores and osteosarcoma patients with a 2-years and 5-years survival rate. In the 2-years survival rate group, there were 9 (45.0%), 7 (35.0%), and 4 (20.0%) patients with mGPS scores of 0, 1, and 2. Meanwhile, there were (71.4%), 2 (28.6%), and 0 (0.0%) patients with mGPS scores of 0, 1 and 2 in the 5-years survival rate group.

The significance value (p-value) obtained was 0.033 for the 2-years survival rate group and 0.009 for the 5-years survival rate group. Because the p value <0.05, it can be concluded that there is a relationship between the mGPS score and the number of patients with 2-year survival rate and 5-year survival rate.

Conclusion

The prevalence of osteosarcoma primary bone tumors based on this study was greater in males with a rate of 76-24% and a ratio of 3:1. The highest prevalence of osteosarcoma was found in the 2nd decade of life, followed by the 3rd and 1st decade. The most common predilection for osteosarcoma was found in the distal femur and proximal tibia in 35% and 35%, respectively. Based on the data analysis, it was found that there was a significant relationship between the mGPS score and the 2-year and 5-year life expectancy in osteosarcoma patients.

Acknowledgements

The authors would like to acknowledge H. Adam Malik General Hospital Medan Team for their assistance to finish this research.

References

Pedoman nasional pelayanan kedokteran tata laksana osteosarkoma. Keputusan Menteri Kesehatan Republik Indonesia Nomor HK.01.07/MENKES/88/2019.

Jensen, A., Jacobsen, JB., Norgaard, M., Yong, M., Fryzek, JP., Sorensen, HT., 2011. Incidence of bone metastases and skeletal-related events in breast cancer patients: A population-based cohort study in Denmark. BMC Cancer.