The effect of the modified Glasgow prognostic score in metastatic gastric cancer

Ahmet Ozveren[a*], Mustafa Sahbazlar[b]

[a]Private Izmir Kent Hospital, Department of Medical Oncology, Izmir, Turkey.
[b]Manisa Celal Bayar University, Department of Medical Oncology, Manisa, Turkey.

Abstract

Background: Metastatic gastric cancer (GC) is the third most common cause of cancer-related death. At the time of metastatic stage treatment is given for palliative purposes. Therefore parameters other than performance status are needed to determine the prognosis.

Objectives: It is aimed demonstrate that the modified Glasgow Prognostic Score (mGPS) is prognostic factor for overall survival and mGPS is a sensitive marker in patients diagnosed with metastatic GC in Turkish population.

Materials and Methods: Clinical and laboratory data were collected and evaluated in the form of retrospective file scanning of One hundred forty-five patients with metastatic GC in Private Izmir Kent Hospital between 2017 and 2022. Analyzed factors included age, gender, precense of de novo or recurrent disease, first line treatment, ECOG-PS score, mGPS, CRP, and albumin levels, Progression Free Survival (PFS) and Overal Survival (OS).

Results: The median age at diagnosis was 67 years, the median progression-free survival (PFS) was 5.3 months, and the median overall survival (OS) was 9.5 months. OS was 15.1 months in patients with an mGPS of 0, 9.3 months in patients with an mGPS of 1, and 6.4 months in patients with an mGPS of 2 (*p=0.001).

Conclusions: mGPS is an easy to use and applicable parameter in Metastatic GC. High mGPS is poor prognostic factor for both PFS and OS in metastatic GC.

Keywords: Metastatic gastric cancer; Modified Glasgow prognostic score; Prognosis.
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Introduction

Gastric cancer (GC) ranks third leading cause among cancer-related deaths**(Bray et al., 2020)**. GC is twice as common in men than women. GC is usually diagnosed at the metastatic stage**(Digklia and Wagner, 2016)**. At the time of metastatic stage there is no possibility of curative treatment. In the metastatic stage, treatment is given for palliative purposes. The primary goal is to prolong life and improve quality of life**(Glimelius et al., 1997)**.

In metastatic disease, the average survival time with best supportive care is 3-4 months, while it is over 1 year with chemotherapy**(Van Cutsem et al., 2006)**. Therefore, treatment is recommended for patients who are in a suitable performance state for chemotherapy**(Lordicket al., 2022)**. The doublet regimen is generally recommended because of the limited benefit of triplet therapy compared to doublet chemotherapy and its significantly higher toxicity**(Muro et al., 2019)**.

In previous studies, parameters such as tumor grade, BMI, number of metastatic areas, performance score, LDH level, local treatment and chemotherapy were found to be prognostic factors**(Lu et al., 2013)**.

In previous studies, many markers that may be prognostic in advanced GC have been investigated. One of these markers is the modified Glasgow prognostic score (mGPS)**(Jiang et al., 2012; Li et al., 2014; Hsu et al., 2015)**. This retrospective study was conducted to evaluate the clinicopathological features and prognostic role of mGPS in metastatic gastric cancer in the Turkish patient population.

Patients and Methods

One hundred forty-five patients who were diagnosed as having stage 4 GC in Private Izmir Kent Hospital between 2017 and 2022 were included in the study. This retrospective study complied with the standards of the Declaration of Helsinki. Patients' age, gender, Eastern Cooperative Oncology Group (ECOG) performance status (PS) score, and laboratory parameters at the time of diagnosis were evaluated. Laboratory parameters including, C-reactive protein (CRP), albumin levels were evaluated using blood samples at the first outpatient admission. Univariate and multivariate analyses were used to identify predictive factors of OS in patients with stage-4 GC. Analyzed factors were age, gender, precense of de novo or recurrent disease, first line treatment, ECOG-PS score, mGPS, CRP, and albumin levels, Progression Free Survival (PFS) and Overal Survival (OS).

The ages of the patients were evaluated by categorizing them as >65 years and ≤65 years, defined as the young population in the WHO recommendation **(Organization, 2020)**.

When calculating mGPS, patients with high CRP (>1 mg/dl) were given 1 or 2 points depending on the absence or presence of hypoalbuminemia (<3.5 g/dl), those with no elevation in CRP (≤1 mg/dl) hypoalbuminemia 0 points were given even if available.

PFS was calculated as the time from the date of diagnosis of metastatic GC to progression during first line chemotherapy or discontinuation of first line chemotherapy. OS was calculated as the time from the date of diagnosis of

metastatic GC to the date of death or the last analysis.

Statistical analysis

Analysis was performed using the SPSS 22.0 database.PFS and OS was assessed using Kaplan-Meier analysis and log-rank analysis was performed to confirm the significance of all variables. Cox regression analysis was used to analyze the prognostic factors, and hazard ratios (HR) and 95% confidence intervals (CI) were calculated. Statistical analyses were performed using the SPSS statistics package, version 22.0 (IBM). P values of <0.05 were accepted statistically significant.

Results

One hundred forty five patients were included in the study. The median age at diagnosis was 62 (Range 32-79) years, the median progression-free survival (PFS) was 5.3 months, and the median OS was 9.5 months. One hundred one (69.7%) of the cases were male. Twenty four (16.6%) of the patients were diagnosed as de novo disease.

Twenty patients (13.8%) did not receive any chemotherapy, 17 patients (11.7%) received a single-agent chemotherapy regimen, 56 patients (38.6%) received a doublet regimen, and 52 patients (35.9%) a triplet regimen. (**Table.1**).

Table 1. Number and percentage distribution of demographic and laboratory data

Variables	n	%		Variables	n	%
ECOG				**Albumin**		
• 0-1	125	86.2		• >3.5 g/dL	101	69.7
• ≥2	20	13.8		• ≤3.5 g/dL	44	30.3
Gender				**CRP**		
• Female	44	30.3		• ≤1 mg/L	47	32.4
• Male	101	69.7		• >1 mg/L	98	67.6
De novo				**Metastatic sites**		
• Yes	24	16.6		• ≤2	73	50.3
• No	121	83.4		• >2	72	49.7
CT				**mGPS**		
• Monotherapy	17	11.7		• 0	47	32.4
• Doublet	56	38.6		• 1	60	41.4
• Triplet	52	35.9		• 2	38	26.2
• None	20	13.8				
Age (Years)				**Exitus**		
• >65	51	35.2		• Yes	137	94.5
• ≤65	94	64.8		• No	8	5.5

When ECOG PS 0 and 1 patients were combined in a single group and compared with ECOG PS 2 patients, the mOS was determined as 11.1 months vs 2.1 months (p=0.007). PFS analysis according to ECOG PS could not be performed because chemotherapy was not given to any patient with ECOG PS 2 or higher.

mPFS was 4.9 months in 56 patients who received doublet chemotherapy, and mPFS was 6.3 months in 52 patients who received triplet chemotherapy. (p= 0.421)mOS was 10.6 months in 56 patients who received doublet chemotherapy, and mOS was 11.3 months in 52 patients who received triplet chemotherapy. (p= 0.208)

While mOS was 15.8 months and mPFS was 7.1 months in patients with de novo disease; In patients with recurrent disease, mOS was 8.4 months (p=0.001), mPFS was 5.3 months (p=0.220).

There was no significant difference in terms of PFS and OS between those with and without metastatic sites >2. While there was no significant difference in PFS between those aged >65 and those who were not, OS was statistically significant (8.6 months vs 11.7 months p=0.027).

There was no statistically significant difference between the genders in terms of OS and PFS.

The number of patients with albumin value <3.5 g/dl was 44 (30.3%), and the number of patients with CRP value >1 mg/dl was 98 (67.6%). Forty-seven patients (32.4%) had mGPS 0, 60 patients (41.4%) had mGPS 1, and 38 patients (26.2%) had mGPS 2.

PFS was 7.1 months in patients with an mGPS of 0, 4.9 months in patients with an mGPS of 1, and 2.9 months in patients with an mGPS of 2 (*p=0.001) (**Fig.1**). OS was 15.1 months in patients with an mGPS of 0, 9.3 months in patients with an mGPS of 1, and 6.4 months in patients with an mGPS of 2 (*p=0.001) (**Fig.2**).

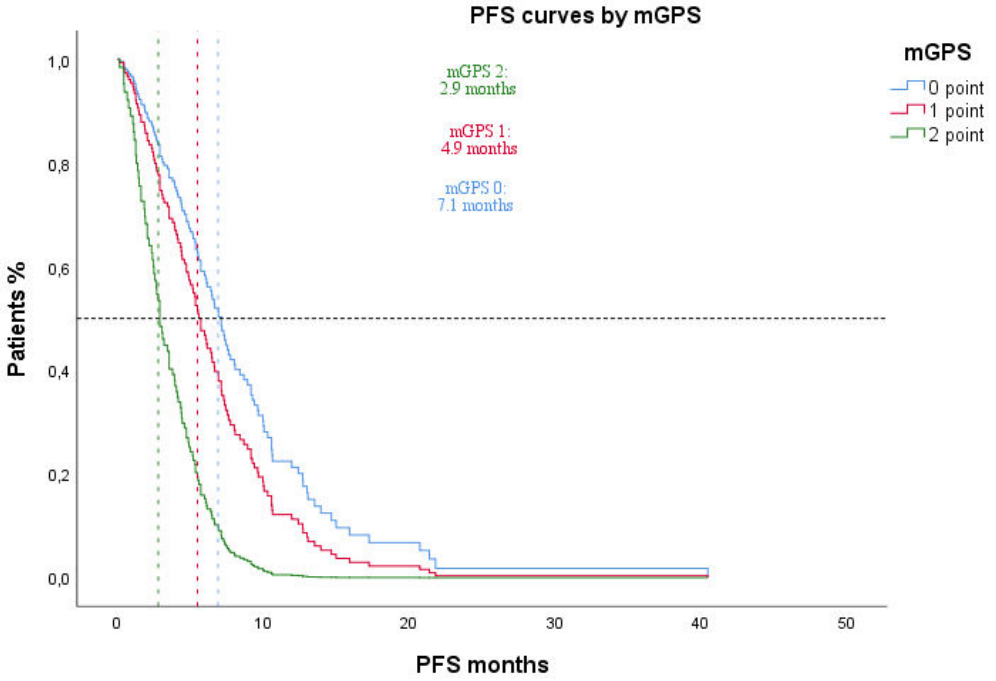

Fig.1. PFS curves by mGPS score

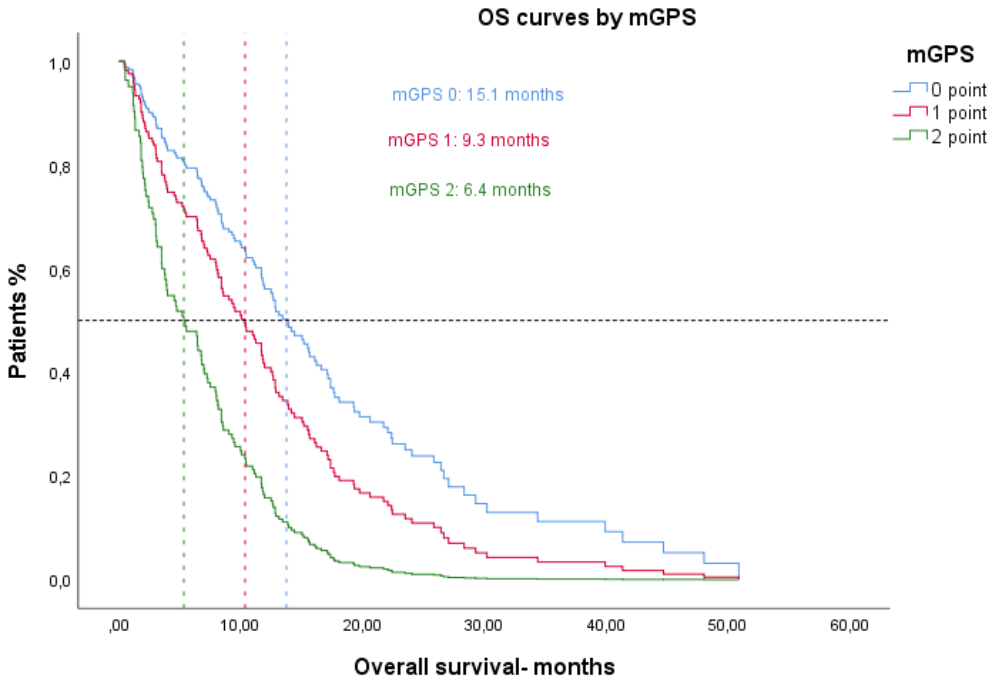

Fig.2. OS curves by mGPS score

A multivariate analysis was performed to compare those with ECOG PS, de novo disease, age category and mGPS (0 and 1 in one group and compare them with those with mGPS 2). As a result of this analysis, it was determined that ECOG PS, the precense of de novo disease and mGPS was associated with OS (**Table.2**).

Table 2. Univariate and multivariate analysis of factors affecting overall survival

Variables	**Univariate analysis**	(95% CI)	**P-value**	**Multivariate analysis**	(95% CI)	**P value**
	HR			HR		
ECOG	0.42	(0.26-0.68)	**<0.001**	0.28	(0.17-0.47)	**<0.001**
mGPS	0.53	(0.36-0.76)	**0.001**	0.40	(0.27-0.59)	**<0.001**
De novo disease	1.84	(1.15-2.93)	**0.01**	2.99	(1.80-4.98)	**<0.001**
Age >65	0.68	(0.48-0.98)	**0.04**	0.73	(0.50-1.05)	0.088

Discussion

Modified GPS has been widely adopted as a systemic inflammatory marker. Modified GPS having been shown to be a prognostic marker for survival in such advanced GC patients receiving palliative chemotherapy(**Zhang et al., 2016**). mGPS was significantly associated with a shorter OS and tended to be associated with a shorter PFS(**Kurosaki et al., 2020**). There are many articles about GPS and mGPS, especially in Far East countries, whose experience with GC is known(**Hirashima et al., 2014; Kurosaki et al., 2020; Zhang et al., 2022**).

The incidence of GC in Turkey differs in regional distribution. It is observed that the frequency and characteristics of GC differ as one goes to the east of the country(**Tözün, 2002; Hirashima et al., 2014; Bagci et al., 2016; Fatih et al., 2016)**.

The Glasgow prognostic score (GPS) and modified GPS (mGPS) are calculated by the combination of pretreatment albumin and C-reaction protein (CRP) levels. There are minor differences in the definition of Score 1 between the two parameters(**Nozoe et al., 2014; Kim et al., 2020**). Recently, both GPS and mGPS have shown great value in predicting the survival outcome of various types of cancer(**Osugi et al., 2016; Qi et al., 2019; Nie et al., 2020**). Modified GPS has the advantages of being easily accessible and feasible in clinical use, and therefore potentially broadly applicable.

There are many studies and meta-analyses and conflicting data on comparing GPS and mGPS and which one is better(**Nozoe et al., 2011; Hirashima et al., 2014**). Modified GPS was preferred in this study. There are many studies evaluating mGPS in GC in preoperative, postoperative and metastatic stages(**He et al., 2018; Derici et al. 2019; Hirahara et al., 2020**). As the mGPS score increases, overall survival decreases(**Nozoe et al., 2011**). In this study, similar results were obtained in accordance with the literature(**Mimatsu et al., 2014**).

Conclusion

The mGPS is an easy to use and applicable parameter in Metastatic GC. High mGPS is poor prognostic factor for both PFS and OS in metastatic GC. The retrospective nature of the study can be considered as a limitation, but it is valuable because it shows the relatively sufficient number of patients and the use of this applicable scoring system in the Turkish population.

Conflict of interest

We declared that, there is no conflict of interest or financial support from any agency.

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