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Original Article

Clinical Gestalt and TIMI Risk Score in Predicting Major Cardiac Event in Patients with Chest Pain at Emergency Department

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Abstract

Objective*: In this prospective observational study, the TIMI risk score and clinical gestalt were compared in terms of detecting a major adverse cardiac event (MACE) in patients presenting with chest pain at ED.*
Methods*: A total of 351 patients were evaluated by experienced clinicians in respect of the TIMI risk score (1-7 points) and clinical gestalt (in terms of low-, medium- and high-risk major adverse cardiac event). The primary outcome was a major adverse cardiac event within 14 days of presentation at ED.*
Results*: A major adverse cardiac event occurred within 14 days in 87 (24.7%) of 351 patients. The sensitivity of clinical gestalt was 93.10% (85.59%-97.43%), and the specificity of the TIMI risk score was 75.89% (71.33%-81.84%). The TIMI risk score and clinical gestalt were found to have similar results in detecting a major cardiac event (AUC: 0.75; AUC: 0.72).*
Conclusion: The results of the present study showed that TIMI scoring and clinical gestalt detect any major adverse cardiac event at similar rates in patients presenting with chest pain at ED.

Key words: *TIMI score, Clinical gestalt, Chest pain, Major adverse cardiac event*

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Introduction

Chest pain is a leading cause of Emergency Department (ED) admissions (1), with approximately 25% of all ED admissions due to acute coronary syndrome (ACS) (2). The use of specialized scoring methods (EDACS, TIMI, HEART, GRACE) is recommended for acute coronary syndrome (3).

The 2021 AHA Guideline recommends the use of HEART, TIMI and EDACS risk score (3). TIMI risk score is a practical, low-parameter, easy-to-use scoring method (4). A risk assessment is performed with TIMI risk score in terms of major adverse cardiac events (MACE) in a 14-day period, and a score of <3 is considered low-risk and > 5 as high-risk. Although many clinical scoring systems are used in the evaluation of patients presenting with chest pain, the clinician's clinical experience cannot be excluded in patient evaluation (3).

The scoring systems were created to help clinicians. However, many clinicians suppose that their clinical gestalt are superior. Clinical gestalt is defined as a clinician’s reasoning to find the appropriate diagnosis and make the most appropriate choice in a patient’s diagnosis/treatment process. As a brief definition, clinical gestalt is the opinion of a clinician (5).

Clinical gestalt is characterized by an intuitive approach to recognition and decision making. It has been reported in literature that the gestalts of experienced clinicians are more suitable (6,7). However, it should also be remembered that clinical gestalt is not faultless. Most clinicians make diagnostic mistakes when they encounter complex cases (8). In the literature, there are studies comparing clinical gestalts with HEART score and parameters, such as electrocardiography (ECG) and cardiac marker (1). However, there is no study in the literature which has compared clinical gestalt and TIMI risk score in terms of major adverse cardiac events.

In the study, clinical gestalt and TIMI risk score were compared in terms of a recent major adverse cardiac event in patients presenting with chest pain in ED.

Materials and Methods

Study design and patient selection

The study was a prospective and observational study that was performed in the Emergency Department of XXXXX Hospital. The study was initiated after the approval of the ethics committee of Dokuz Eylül University. Patients aged 18 years and older from whom a participation consent form was received were included in the

study. Patients who were diagnosed in an external center, those with traumatic chest pain, who declined to participate in the study, and who could not complete the form in the ED were not included in the study. Patients with symptoms such as epigastric pain, known as the equivalent of chest pain, and dyspnea were not included in the study.

Data collection

The clinical gestalt evaluations of the patients were performed by physicians who had experience more than 24 months in emergency medicine. The patient's anamnesis, physical examination, and ECG results of the patient were used during these evaluations. During the evaluation, it was ensured that the evaluator was blinded to cardiac biomarker results and consultation opinions. Clinicians were requested to assess patients admitted to the hospital with chest pain as low, intermediate, and high risk for 14-day MACE. The TIMI risk score was carried out by the physicians who followed up with the patients. In the classification, 0-2 points were accepted as low risk, 3-4 points as moderate risk, and 5-7 points as high risk. The clinical gestalt and TIMI risk score were applied blinded by different physicians. The medical records of the patients included in the study were reviewed 14 days after ED admission and their presentations were re-evaluated or they were contacted and asked if they had experienced an MACE during this time.

Statistical Analysis

Absolute values were used for the descriptive statistics Groups were compared with Kruskal Wallis test. Afterwards, post-hoc analyses were performed with Mann-Whitney U test. During the evaluation of the analysis, the sensitivity, specificity, LR, LR, PPV, and NPV values were specified for each evaluation. Comparisons of paired evaluations were made using ROC analysis. The area under curve(AUC) values were calculated. The AUC value was also compared with the Long test. A confidence level of 95% was accepted for all tests. A value of $p<0.05$ was accepted as statistically significant. Statistical analyses of the data were made using Statistical Package for Social Sciences for Windows ver. 27.0 software

Results

The study initially included a total of 366 patients who presented with chest pain at ED. A total of 15 patients were excluded from the study; 10 because of unavailable medical records and they could not be contacted by telephone, and 5 because of incomplete data. Thus, evaluation was made of 351 patients.

131 (37.3%) of the patients were female. The median age of the patients was 53 (min-max 18-93). 165 (47%) of the patients had hypertension and 78 (22.2%) had diabetes mellitus. 125 (35.6%) were smokers. Cardiac marker elevation was present in 40 (11.4%) patients with chest pain. Of the patients with chest pain, 119 (33.9%) had previously been diagnosed coronary stenosis. 154 (43.9%) of the patients experienced chest pain 2 or more times within 24 hours. Other demographic data of the patients are summarized in Table 1.

Table 1. Demographic Information

Specifications		**Total population (n=351)**	**MACE (n=87)**	**Non-MACE (n= 264)**
Gender	**Female**	131 (37.3%)	31 (35.6%)	100 (37,95)
	Male	220 (62.7%)	56 (64.4%)	164 (62,1%)
Age	**Average**	53 (18-93)	60 (33-88)	52 (18-93)
	65 years and over	95 (27.1%)	33 (37.9%)	62 (23,5%)
The presence of CAD in the family		160 (45.6%)	49 (56.3%)	111 (42%)
HT		165 (47%)	53 (60.9%)	112 (42.4%)
DM		78 (22.2%)	27 (31%)	51 (19.3%)
Hyperlipidemia		85 (24.2%)	26 (29.9%)	59 (22.3%)
Smoking		125 (35.6%)	33 (37.9%)	92 (34.8%)
Aspirin use		108 (30.8%)	41 (47.1%)	67 (25.4%)
Cardiac marker elevation		40 (11.4%)	27 (31%)	13 (4.9%)
ST segment depression		26 (7.4%)	11 (12.6%)	15 (5.7%)
0.5mm elevation in ST segment		5 (1.4%)	3 (3.4%)	2 (0.8%)
≥1mm elevation in ST segment		18 (5.1%)	11 (12.6%)	4 (1.5%)
Presence of 50% excess coronary stenosis		119 (33.9%)	48 (55.2%)	71 (26.9%)
Recurrent chest pain (≥2 times in 24 hours)		154 (43.9%)	53 (60.9%)	101 (38.3%)

TIMI Risk Score and Clinical Gestalt Results

When the TIMI risk score of the patients was evaluated, it was seen that 233 (66.4%) patients were in the low-risk, 90 (25.6%) were in the moderate-risk and 28 (8.0%) patients were in the high-risk group. According to the clinical gestalt assessments, 111 (31.6%) patients were in the low-risk, 152 (43.3%) were in the moderate-risk and 88 (25.1%) patients were in the high-risk group.

Table 2. Possibility evaluation of TIMI risk score and clinical gestalt.

TIMI		**Low (n=233)**	**Moderete (n=90)**	**High (n=28)**	**p**		
MACE	**Yes n (%)**	30	40	17	<0.001	p^{1-2}	<0.001
	No n(%)	203	50	11		p^{1-3}	<0.001
						p^{2-3}	0.134
Clinical Gestalt		**Low(n=111)**	**Moderete(n=152)**	**High (n=88)**	**p**		
MACE	**Yes n(%)**	6	35	46	<0.001	p^{1-2}	<0.001
	No n(%)	105	117	42		p^{1-3}	<0.001
						p^{2-3}	<0.001

Patient Outcomes

It was determined that MACE developed within the first 14 days in 87 (24.7%) patients. Of these patients, 1 (1.1%) had patients received thrombolytic treatment and 3 (3.4%) patients died because of ACS. The first 2 of the death cases occurred within the first 24 hours. Coronary artery bypass graft (CABG) operation was performed on 8 (9.2%) patients because of multivessel disease. The sensitivity and specificity of TIMI scoring and clinical gestlt assessment were evaluated and patients were divided into two groups as AMI again within 14 days. Coronary angiography was applied to 81 (93.1%) patients during the same period and a stent was placed when needed. Only 1 of these

low risk and intermediate-high risk. The sensitivity and specificity values of the TIMI risk score in terms of predicting the development of MACE were determined as 65.52% (54.56%-75.39%) and 75.89% (71.33%-81.84%), respectively. According to the clinical gestalt, MACE was seen in 6(5.4%) patients in the low-risk patient group (n=111). The sensitivity and specificity values of the clinical gestalt were

determined as 93.10% (85.59%-97.43%) and 39.77% (33.82%-45.95%), respectively (Table 3).

In the ROC analysis of TIMI score and clinical gestalt, the area under the curve was 0.75 for clinical gestalt, and 0.72 for the TIMI score. When the AUCs of the groups were compared, no significant difference was found between the AUC areas (p=0.509) (Figure 1).

Table 3. Conformity comparison between the TIMI risk score and clinical gestalt risks.

	Sensitivity (95% CI)	Specificity (95% CI)	LR+ (95% CI)	LR- (95% CI)	PPV (95% CI)	NPV (95% CI)
TIMI	65.52% (54.56%-75.39%)	75.89% (71.33%-81.84%)	2.84 (2.17-3.71)	0.45 (0.33-0.60)	48.31% (41.69%-54.98%)	87.12% (83.41%-90.11%)
Clinical gestalt	93.10% (85.59%-97.43%)	39.77% (33.82%-45.95%)	1.55 (1.38-1.73)	0.17 (0.08-0.38)	33.75% (31.26%-36.33%)	94.59% (88.85%-97.46%)

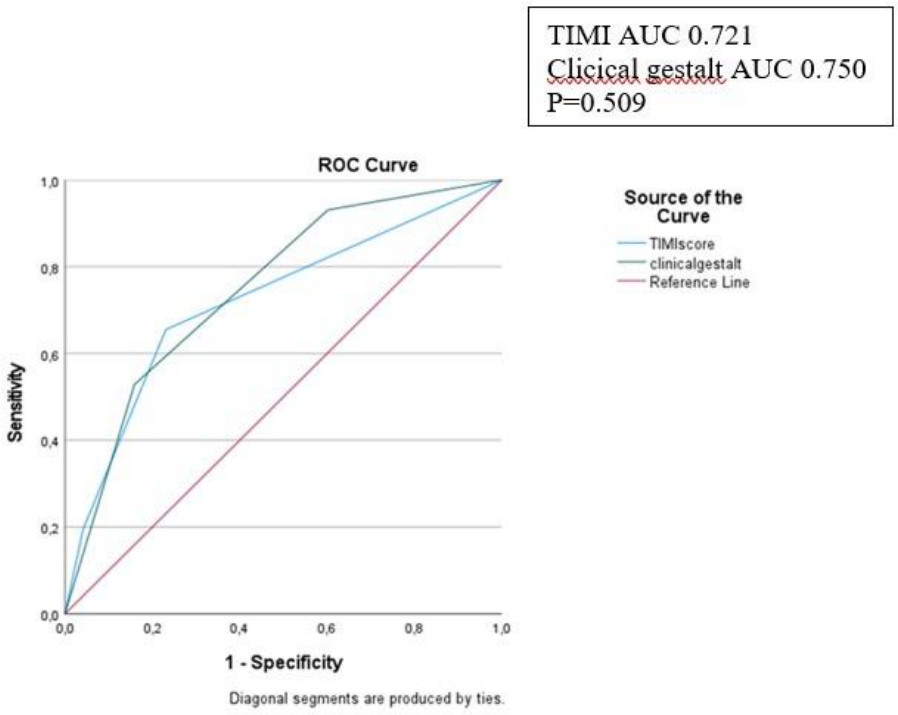

Figure 1. ROC analysis of TIMI risk score and clinical gestalt

Discussion

The results of the present study showed that the TIMI risk score and clinical gestalt methods have equal power in detecting a major cardiac event in patients with chest pain. This similarity in clinical detection supports the view that the clinical gestalt of a clinician is as valuable as at least one scoring system, because it is known that approximately 25% of patients who present at ED with chest pain experience a major cardiac event. In a previous study by Visser et al., it was shown that the clinical gestalt was able to detect acute coronary syndrome at similar rates to HEART scoring (1). However, no clear superiority was stated. Although there is the same similarity statistically in the present study, the fact that the 3 cases of mortality were in the low-risk group according to the TIMI risk score while they were in the moderate-risk group according to the clinicians shows the effect of the clinical gestalt. Even though scoring methods and clinical gestalt seem close to each other, they remain incapable in certain case groups. In these special cases, the joint use of these methods is more important in terms of patient safety. In a study by Wong CP et al., the risk scorings were compared in terms of detecting major cardiac events in patients by ignoring the clinical gestalt and the HEARTS method was the reported to be the first-, and the TIMI method the second-best scoring system for detecting MACE (9). The present study demonstrated that clinical gestalt is as good as TIMI risk score in detecting MACE. However, in the study by Visser et al., it was shown that clinical gestalt was as sensitive as HEARTS score in detecting MACE. Given this situation, the studies conducted have shown that clinical gestalt is as sensitive as these two scoring methods in detecting MACE.

Body et al. studied the effect of clinical gestalt on the recognition and exclusion of acute myocardium infarction in ED. In that study, it was emphasized that a recent MACE could not be detected with clinical gestalt alone without the ECG and biomarker values and it should not be used alone in making a diagnosis or exclusion (10). The ECG findings were added to the present study. The gestalt evaluation was made without seeing the cardiac biomarker values, then compared with the scoring method including the cardiac biomarkers and similar risk results were obtained.

Mokhtari et al. determined that clinic gestalt was superior to single parameters both in recognition and exclusion after comparing medical history, ECG and troponin with clinical gestalt in patients presenting at ED with chest pain (11). However, this is not a surprising result.

Clinical gestalt continues to be studied in many diseases, not only in the detection of acute coronary syndrome in patients with chest pain. In the study conducted by Soto-Mato et al. in which COVID-19 mortality scores and clinical gestalt were evaluated, no score evaluated was found to be significantly superior to clinical gestalt (11). In addition, in another study comparing pulmonary embolism prognostic scoring with clinical gestalt, it was reported that clinical gestalt did not outperform the prognostic score. In our study, although clinical gestalt was not inferior to the prognostic score, it was found to be functional in the detection of rare cases (12).

In the present study, the clinical gestalt evaluations and TIMI risk score evaluations cannot be compared because of statistical non-conformity between them. Considering the distribution, it is seen that physicians who perform a gestalt evaluation take a group with low-risk according to the TIMI risk score as a moderate-risk group, resulting in an inconsistent distribution. It can be seen that physicians were more clinically sensitive than any scoring and the specificity values were lower. This sensitivity includes all 3 cases in the present study which resulted in death. Although the scoring methods detect any MACE at similar rates to clinical gestalt, physicians should not remain limited by these methods but should listen to their inner voice and experience (clinical gestalt) in special cases.

Conclusion

In conclusion, clinical gestalt and TIMI risk score are similarly successful in detecting any major cardiac event in patients presenting with chest pain at ED. However, even if a patient seems to be at low risk, a re-evaluation must be carried out by the physician during the discharge period when there is any doubt.

Limitations

There were cases which could not be included in the study because of the workload in the ED.

Conflict of Interest

The financial support of our work was provided by the study team.

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