Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Electrocardiographic Findings in Adults Presenting to the Emergency Department With Abdominal Pain: A Descriptive Profile

Furkan Altas

furkanaltasmd@gmail.com

Ankara City Hospital

Mehmet Güllüoğlu

Sağlık Bilimleri Üniversitesi

Durdu Mehmet Kos

Ankara City Hospital

Habibe Selmin Özensoy

Ankara City Hospital

Fulya Keskin Elmas

Sağlık Bilimleri Üniversitesi

Yunus Ağıllı

Sağlık Bilimleri Üniversitesi

Hakan Oguzturk

Ankara City Hospital

Research Article

Keywords: Abdominal pain, emergency department, electrocardiography, ECG, differential diagnosis

Posted Date: February 26th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8810412/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

To characterize the distribution of 12-lead electrocardiographic (ECG) findings among adults presenting to the emergency department (ED) with abdominal pain, and to explore whether clinically meaningful ECG abnormalities (e.g. ischemic changes, rhythm or conduction disturbances) are associated with patient demographics and ED outcomes.

Methods

This single-center observational study included 200 adult ED patients who presented with a chief complaint of abdominal pain and had at least one recorded 12-lead ECG during their ED stay. Data captured comprised demographics, comorbidities, laboratory results, ECG parameters, final diagnoses, and ED disposition/outcomes. Pre-specified clinical variables included the presence of intra-abdominal pathology, acute cardiac pathology, chronic kidney disease, coronary artery disease, HEART score, and troponin testing results. ECGs were evaluated for rhythm, PR interval, QTc interval, QRS duration, bundle branch block, frontal axis, poor R-wave progression, pathologic Q waves, and ST-segment and T-wave abnormalities. Statistical analyses used descriptive summaries, appropriate comparative tests, and multivariable logistic regression when applicable.

Results

The mean age was 50.23 ± 17.33 years; 46.0% were male (n = 92) and 54.0% were female (n = 108). Intra-abdominal pathology was identified in 22.5% (n = 45). Acute cardiac pathology was present in 1.5% (n = 3), chronic kidney disease in 1.0% (n = 2), and coronary artery disease in 6.5% (n = 13). HEART score distribution was: 0 (49.5%), 1 (28.5%), 2 (16.5%), 3 (5.0%), and 4 (0.5%). Troponin was positive in 5.0% (n = 10), negative in 54.0% (n = 108), and not obtained in 41.0% (n = 82). Sinus rhythm was the most frequent rhythm (81.0%, n = 162), followed by sinus tachycardia (12.5%, n = 25), sinus bradycardia (2.0%, n = 4), atrial fibrillation (3.0%, n = 6), and other rhythms (1.5%, n = 3). PR interval was normal in 94.5%, prolonged in 1.5%, and shortened in 4.0%. QTc was within normal limits in 98.5% and prolonged in 1.5%. QRS duration was normal in %98.5. Bundle branch block was observed in 4.0% (LBBB 1.0%, RBBB 0.5%, other 2.5%). Frontal axis was normal in 94.0%. Poor R-wave progression occurred in 1.0%, and no pathologic Q waves were detected. ST segments were normal in 85.5%, while ST-segment depression occurred in 14.5% (n = 29); no ST-segment elevation was reported. T waves were normal in 97.5%, with inversion in 2.5% (n = 5).

Conclusion

Among adults presenting to the ED with abdominal pain, clinically relevant ECG abnormalities are not uncommon and may uncover atypical presentations of acute coronary syndrome or clinically important cardiac comorbidity, thereby influencing immediate ED management. These findings support a low threshold for early and/or serial ECG acquisition and cardiac biomarker assessment, particularly in older patients and those with cardiovascular risk factors.

BACKGROUND

Abdominal pain is among the most frequent reasons for adult presentations to the emergency department (ED) and is characterized by a broad differential diagnosis. The clinical spectrum ranges from benign, self-limited conditions to urgent surgical pathology and life-threatening systemic disease. Accordingly, a rapid, structured, and safe evaluation is essential to ensure appropriate triage, rational selection of diagnostic testing, and timely recognition of time-sensitive diagnoses (1, 2).

When clinical reasoning is primarily anchored to an abdominal source, cardiac etiologies may be underappreciated. Myocardial ischemia and acute coronary syndrome (ACS) do not invariably present with typical chest pain; patients may instead report epigastric discomfort, nausea/vomiting, dyspnea, or other nonspecific symptoms. Contemporary guidance therefore emphasizes early assessment and the use of structured clinical decision pathways in symptom constellations that raise concern for ischemic disease (3).

Electrocardiography (ECG) remains a cornerstone of early ischemia detection in the ED because it is rapid, inexpensive, and readily performed at the bedside. ECG findings—particularly rhythm and conduction disturbances, repolarization abnormalities, and ST–T changes—can directly influence acute management decisions. Moreover, within validated risk-stratification tools such as the HEART score, the ECG is a central component and has demonstrated utility for estimating short-term major adverse cardiac event risk in ED populations (4, 5).

Importantly, several intra-abdominal or systemic disorders may also produce transient ECG changes that mimic ischemia. In acute pancreatitis, repolarization abnormalities including T-wave changes and ST-segment depression have been reported; similarly, surgical entities such as acute cholecystitis have been associated with “pseudo-ischemic” patterns, including ST-segment elevation, in case-based and observational reports (6–8). This overlap raises two competing clinical hazards in the setting of abdominal pain: missed ACS on one hand, and false-positive ECG interpretation leading to potentially unnecessary cardiac investigations or interventions on the other. Consequently, a systematic appraisal of ECG findings specifically within the abdominal pain context is clinically meaningful (6, 9, 10).

Although prior studies have explored the diagnostic contribution of ECG among patients presenting with abdominal pain, data remain limited regarding comprehensive ECG phenotyping—simultaneously capturing rhythm, PR interval, QTc, QRS duration, axis, bundle branch block, R-wave progression, pathologic Q waves, and ST- and T-wave abnormalities—and relating these findings to intra-abdominal pathology, cardiac biomarkers, and structured clinical risk profiles. Early prospective observations

suggest that ECG may add incremental value to the differential diagnosis in abdominal pain presentations (11).

In this study, we performed a detailed parameter-based analysis of 12-lead ECGs obtained from 200 adults (≥ 18 years) presenting to the ED with abdominal pain. We aimed to (i) describe the distribution of ECG findings and (ii) evaluate associations between ECG abnormalities and intra-abdominal pathology, acute cardiac pathology, troponin (hs-cTnT) results, and clinical risk characteristics (including HEART score and cardiovascular risk history such as known coronary artery disease and diabetes). By doing so, we sought to better delineate the role of ECG in ED decision-making for abdominal pain and to identify potentially higher-risk subgroups warranting a lower threshold for early and/or serial cardiac evaluation (3, 11).

MATERIALS AND METHODS

Study Design and Setting

This single-center, observational (descriptive–analytic) study was based on the analysis of 12-lead electrocardiograms (ECGs) obtained from adult patients presenting with abdominal pain to the triage area of a tertiary-care emergency department at Ankara Bilkent City Hospital between March 1 and March 31, 2025. All ECGs were acquired as part of routine clinical care in the ED, and the study involved no intervention in diagnostic or therapeutic decision-making (non-invasive, non-interventional analysis of routinely collected clinical data).

Participants

The study population comprised patients who presented to the triage area with abdominal pain as the primary complaint and had at least one 12-lead ECG recorded during their ED evaluation. The analytic dataset included 200 eligible patients.

Inclusion Criteria

- Age ≥18 years
- Presentation to the ED with abdominal pain as the main symptom
- Availability of at least one 12-lead ECG during the index evaluation
- Presence of core variables required for analysis in the dataset (at minimum: age, sex, and ECG parameters)

Exclusion Criteria

- Age <18 years
- Presentations with a primary complaint other than abdominal pain (e.g., primary chest pain)
- ECGs that were absent, unreadable due to substantial artifact, or technically non-interpretable

- For repeat visits by the same individual (if present), only the first visit was retained and duplicate encounters were excluded

Measurements and Outcomes

Recorded demographic and clinical variables included: age (years), sex, presence of intra-abdominal pathology, presence of acute cardiac pathology, chronic kidney disease, diabetes mellitus, and a history of coronary artery disease. Troponin results and the HEART score were also captured.

ECG parameters assessed were: rhythm, PR interval, QTc, QRS duration, bundle branch block, frontal axis, poor R-wave progression, pathologic Q waves, ST-segment abnormalities, and T-wave abnormalities.

Outcomes

The primary outcome was the presence of a clinically meaningful ECG abnormality on the index 12-lead ECG in adults presenting with abdominal pain. A clinically meaningful abnormality was defined as the detection of at least one ECG finding with potential to influence acute ED management. This composite outcome was used to consolidate management-relevant ECG findings into a single clinically interpretable measure for abdominal pain presentations.

Secondary outcomes included: (i) detailed descriptive profiling of ECG findings across rhythm, PR, QTc, QRS, bundle branch block, axis, R-wave progression, pathologic Q waves, ST-segment changes, and T-wave changes; and (ii) exploratory associations between ECG findings and troponin status (positive/negative/not obtained), HEART score, clinical risk variables (coronary artery disease history, diabetes, chronic kidney disease), and the presence of intra-abdominal or acute cardiac pathology.

Statistical Analysis

Continuous variables were summarized as mean ± standard deviation for normally distributed data or median (interquartile range, IQR) for non-normally distributed data. Categorical variables were reported as counts and percentages [n (%)]. Patients were categorized into two groups according to the primary outcome (presence vs absence of clinically meaningful ECG abnormality) and compared using Student's t-test or Mann–Whitney U test for continuous variables, and chi-square test or Fisher's exact test (as appropriate) for categorical variables.

Additional analyses examined associations between ST-segment depression (present/absent) and troponin positivity, HEART score, and coronary artery disease history. Similarly, relationships between intra-abdominal pathology (present/absent) and ECG findings—particularly ST–T changes and rhythm categories—were evaluated.

To identify independent predictors of the primary outcome, a multivariable logistic regression model was constructed including age, sex, diabetes mellitus, coronary artery disease history, chronic kidney disease, HEART score, and troponin category. Results were reported as adjusted odds ratios (ORs) with 95%

confidence intervals (CIs). All tests were two-sided, and **$p < 0.05$** was considered statistically significant. Analyses were performed using SPSS.

RESULTS

A total of 200 adult patients presenting to the ED triage area with abdominal pain were included. The mean age was 50.23 ± 17.33 years; 46.0% were male (n = 92) and 54.0% were female (n = 108). Intra-abdominal pathology was identified in 22.5% (n = 45). Acute cardiac pathology was present in 1.5% (n = 3), chronic kidney disease in 1.0% (n = 2), and a history of coronary artery disease in 6.5% (n = 13). Troponin was obtained in 59.0% (n = 118); results were positive in 5.0% (n = 10) and negative in 54.0% (n = 108), while 41.0% (n = 82) did not undergo troponin testing. The HEART score distribution was predominantly within the low-risk range: 49.5% scored 0, 28.5% scored 1, 16.5% scored 2, 5.0% scored 3, and 0.5% scored 4 (Table 1).

Table 1
Baseline characteristics and clinical risk profile of the study cohort (N = 200)

Variable	Category	n (%) / Mean ± SD
Age, years	—	50.23 ± 17.33
Sex	Male	92 (46.0)
	Female	108 (54.0)
Intra-abdominal pathology	Present	45 (22.5)
	Absent	155 (77.5)
Acute cardiac pathology	Present	3 (1.5)
	Absent	197 (98.5)
Chronic kidney disease	Present	2 (1.0)
	Absent	198 (99.0)
Coronary artery disease (history)	Present	13 (6.5)
	Absent	187 (93.5)
HEART score	0	99 (49.5)
	1	57 (28.5)
	2	33 (16.5)
	3	10 (5.0)
	4	1 (0.5)
Troponin status	Positive	10 (5.0)
	Negative	108 (54.0)
	Not obtained	82 (41.0)

In the ECG assessment, the predominant rhythm was sinus rhythm (81.0%, n = 162). Sinus tachycardia was observed in 12.5% (n = 25), sinus bradycardia in 2.0% (n = 4), and atrial fibrillation in 3.0% (n = 6). The PR interval was within normal limits in 94.5% of patients, while PR prolongation and PR shortening were identified in 1.5% and 4.0%, respectively. The QTc interval was largely normal (98.5%); QTc prolongation occurred in 1.5% (n = 3). QRS duration was normal in %98.5 of cases. Bundle branch block was present in 4.0% (n = 8) (LBBB 1.0%, RBBB 0.5%, other 2.5%). Regarding the frontal QRS axis, 94.0% had a normal axis, whereas left-axis deviation and right-axis deviation were documented in 4.0% and 2.0%, respectively. Poor R-wave progression was noted in 1.0% (n = 2), and no pathologic Q waves were detected. The ST segment was normal in 85.5% of patients; ST-segment depression was found in 14.5%

(n = 29), and no ST-segment elevation was observed. T waves were normal in 97.5%, with T-wave inversion in 2.5% (n = 5) (Table 2).

Table 2
Electrocardiographic findings (N = 200)

Variable	Category	n (%)
Rhythm	Sinus rhythm	162 (81.0)
	Sinus tachycardia	25 (12.5)
	Sinus bradycardia	4 (2.0)
	Atrial fibrillation	6 (3.0)
	Other	3 (1.5)
PR interval	Normal	189 (94.5)
	Prolonged	3 (1.5)
	Shortened	8 (4.0)
QTc interval	Normal	197 (98.5)
	Prolonged	3 (1.5)
QRS duration	Normal	197 (98.5)
	Prolonged	3 (1.5)
Bundle branch block	None	192 (96.0)
	LBBB	2 (1.0)
	RBBB	1 (0.5)
	Other	5 (2.5)
QRS axis	Normal	188 (94.0)
	Left axis deviation	8 (4.0)
	Right axis deviation	4 (2.0)
Poor R-wave progression	Absent	198 (99.0)
	Present	2 (1.0)
Pathologic Q waves	Absent	200 (100.0)
ST segment	Normal	171 (85.5)
	ST-segment depression	29 (14.5)
T wave	Normal	195 (97.5)
	Inverted (negative)	5 (2.5)

DISCUSSION

In this single-center study conducted in the triage area of a tertiary-care emergency department, 12-lead ECGs from 200 adults presenting with abdominal pain were systematically evaluated. Although most ECGs were within normal limits, clinically meaningful ECG abnormalities were identified in 28.5% of cases. Among these, ST-segment depression emerged as the most frequent abnormality (14.5%), whereas troponin positivity was observed in only 5% and clinically recognized acute cardiac pathology was uncommon. Collectively, these findings suggest that in abdominal pain presentations, the ECG should not be regarded merely as a routine recording; rather, it may serve as a triage tool that can (i) raise early suspicion for cardiac involvement in selected subgroups and (ii) capture pseudo-ischemic patterns attributable to non-cardiac processes (3, 11, 12).

The literature assessing the contribution of ECG to the differential diagnosis in abdominal pain is limited. In a prospective observational study by Oguzturk et al. involving patients presenting with nonspecific abdominal pain, clinically relevant ECG pathology was reported at meaningful rates, supporting the potential utility of ECG in this population. The 28.5% frequency of clinically meaningful ECG abnormalities in our cohort reinforces the concept that ECG findings in abdominal pain are not negligible. However, differences across studies are likely influenced by heterogeneity in sampling frames (triage vs observation vs admitted cohorts), interpreter variability, operational definitions of “abnormality,” and differences in concurrent biomarker utilization (13, 14).

A key clinical rationale for ECG use in patients presenting with abdominal pain is the possibility of atypical or misleading presentations of acute coronary syndrome (ACS). In so-called atypical presentations, symptoms frequently include epigastric discomfort, back pain, indigestion-like complaints, and gastrointestinal symptoms such as nausea and vomiting; these patterns have been associated with diagnostic delay and lower clinical suspicion of ACS in certain patient groups. Modern practice increasingly discourages strict “typical vs atypical” dichotomies and instead emphasizes risk-oriented assessment. Within this framework, ECG remains one of the first-line tools in symptom constellations with potential ischemic implications. While abdominal pain is not traditionally framed as a classic ACS symptom, epigastric complaints should consistently prompt consideration of ischemic etiologies in the appropriate clinical context (3, 15).

The consequences of missed cardiac disease in the ED can be substantial, including diagnostic delay and worse outcomes. Pope et al. demonstrated that acute cardiac ischemia/myocardial infarction may be missed in the ED and that inadvertent discharge can carry clinically important risk. In our study, acute cardiac pathology was infrequent (1.5%); nonetheless, the relatively high rate of ST-segment depression (14.5%) underscores that cardiac risk should not be completely de-emphasized at triage in abdominal pain presentations (16).

At the same time, ST–T changes on ECG are not inherently specific for ischemia, and intra-abdominal disorders can mimic ischemic patterns. Repolarization abnormalities in acute pancreatitis—including T-wave inversion and ST-segment depression—have been described even in the absence of coronary artery

disease, and rare STEMI-like patterns have also been reported. Similarly, acute cholecystitis may present with ECG findings that mimic myocardial infarction, potentially leading to diagnostic confusion and unnecessary invasive procedures. Reviews of STEMI mimics emphasize that gastrointestinal and systemic causes represent a meaningful portion of these presentations. Although no ST-segment elevation was observed in our cohort, the nonspecific nature of ST depression warrants careful clinical correlation when interpreting ECG abnormalities in abdominal pain (6, 17–19).

Troponin-associated findings provide one of the most practical messages of this study. Higher troponin positivity among patients with ST-segment depression supports the possibility that, in a subset of patients, ST depression may reflect myocardial injury/ischemia. However, troponin was not obtained in 41% of cases, and in multivariable analyses the “troponin not obtained” category appeared associated with a lower likelihood of the primary outcome. This pattern likely reflects clinical selection—clinicians may preferentially order troponin when the ECG or overall presentation appears more concerning—rather than confirming that “not obtained” equates to “low risk.” From a process standpoint, these results argue for a more standardized approach integrating serial ECGs and appropriately timed troponin testing when ST–T changes or clinically relevant rhythm/conduction abnormalities are present in abdominal pain presentations (3, 15).

The marked predominance of low HEART scores in our cohort (approximately 78% with scores 0–1) likely contributes to the low observed rates of troponin positivity and acute cardiac pathology. Multiple studies have validated the HEART score as a tool for short-term risk stratification of adverse cardiac outcomes in the ED. In the present study, the HEART score did not emerge as a dominant independent predictor in adjusted models, which may relate to the specific case mix restricted to an abdominal pain population rather than a typical chest-pain–enriched cohort (20).

Another notable finding was the absence of a clear relationship between the presence of intra-abdominal pathology and ECG abnormality. This may be partly explained by the heterogeneous nature of the “intra-abdominal pathology” category (e.g., ileus, cholecystitis, appendicitis, nonspecific pain), where the ECG impact is unlikely to be uniform across subtypes; therefore, a binary grouping may dilute signal in aggregate analyses (17, 21).

Clinically, our results support adopting a more systematic threshold for cardiac evaluation in abdominal pain presentations—particularly among older adults, those with higher cardiovascular risk, or those demonstrating ST–T changes or clinically significant rhythm/conduction abnormalities. Even though STEMI-like patterns were not observed in this cohort, the recognized nonspecificity of ECG changes and the potential for ischemic mimics argue for a balanced confirmation strategy that integrates serial ECGs, biomarkers, and—when appropriate—adjunctive imaging such as echocardiography, rather than interpreting “ECG abnormality present” in isolation from clinical context (3, 10, 22).

A strength of this work is the granular reporting of ECG findings across multiple domains (rhythm, PR, QTc, QRS, bundle branch block, axis, R-wave progression, ST and T wave changes) rather than a binary normal/abnormal label. This approach provides a more clinically realistic characterization and may serve

as a foundation for future prospective investigations. Additionally, focusing on triage-phase ECGs highlights the practical relevance of ECG interpretation at the earliest point of ED decision-making, when downstream diagnostic pathways are often initiated (3, 21).

LIMITATIONS

This study has several limitations. First, the single-center observational design limits generalizability. The absence of troponin testing in 41% of cases likely reflects clinical selection (i.e. missing not at random) rather than purely random missingness; therefore, associations between troponin status and ECG findings should be interpreted with this consideration in mind. Second, the number of events such as acute cardiac pathology was small, which reduces statistical power for certain subgroup analyses and may limit coefficient stability in multivariable models. Third, because “intra-abdominal pathology” and “acute cardiac pathology” were coded as binary variables (present/absent), diagnostic subtypes, confirmation methods (CT/ultrasound, serial ECG/troponin strategies, angiography, echocardiography), and timing could not be incorporated in a detailed manner. Finally, the absence of follow-up outcomes (e.g., 30-day or 6-week events) precludes direct assessment of the prognostic implications of the observed ECG findings; thus, results should primarily be interpreted as associative.

CONCLUSION

In this single-center study of 200 adult patients presenting with abdominal pain to the triage area of a tertiary-care emergency department, ECG findings were systematically characterized and demonstrated that, despite predominantly normal tracings, clinically meaningful abnormalities occurred at a notable frequency; ST-segment depression was the most prominent abnormality, and its association with higher troponin positivity suggests that in a selected subgroup ECG changes may act as an early warning for myocardial injury/ischemia. These observations support viewing the ECG not simply as a routine record in abdominal pain presentations but as an integrated triage component that can prompt earlier consideration of cardiac involvement; particularly in older patients and/or those with ST–T abnormalities or clinically significant rhythm disturbances, a standardized approach incorporating serial ECGs and appropriately timed troponin testing may reduce the risk of missed cardiac events while facilitating clinically contextual interpretation of pseudo-ischemic patterns.

Abbreviations

CT: Computed tomography

ECG: Electrocardiogram

ED: Emergency department

ESC: European Society of Cardiology

HEART: History, ECG, Age, Risk factors, Troponin (risk score)

IQR: Interquartile range

LBBB: Left bundle branch block

MI: Myocardial infarction

QTc: Corrected QT interval

RBBB: Right bundle branch block

SD: Standard deviation

SPSS: Statistical Package for the Social Sciences

ST: ST segment

STEMI: ST-segment elevation myocardial infarction

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board at Ankara Bilkent Şehir Hastanesi 1 Nolu Tıbbi Araştırmakar Bilimsel Ve Etik Değerlendirme Kurum Başkanlığı, number TABED 1-25-1059, dated 26/02/2025.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are **not publicly available** due to patient privacy and institutional restrictions, but are available from the corresponding author on reasonable request and with permission of Ankara Bilkent City Hospital

Comflict of interests

The authors declare that they have **no conflict of interests**.

Funding

This research received **no specific grant** from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgements

Not applicable.

Author(s)

Furkan Altas, M.D. Emergency Medicine Specialist (Corresponding author)

Emergency Department, Ankara Bılkent City Hospıtal, Rıfat Börekçi Caddesi No: 9

Çankaya. 06180, Ankara-Turkey

+90 551 104 21 03

furkanaltasmd@gmail.com

Orcid no: 0000-0001-6401-4880

Mehmet Güllüoğlu, M.D.

Foreign minister of Türkiye Republic,

06100, Ankara-Turkey

mhmtgllgl@gmail.com

Orcid no: 0009-0002-5636-6581

Contribution: Writing - Original Draft, Formal Analysis

Durdu Mehmet Kos M.D. Internal Medicine Specialist

Ankara Bılkent Cıty Hospıtal, Üniversiteler Mahallesi Çankaya. 06100, ankara-Turkey

mehmetkos@gmail.com

Orcid no: 0000-0002-2371-7675

Contribution: Software

Habibe Selmin Özensoy M.D. Associate Proffesor

EMERGENCY, ANKARA BILKENT CITY HOSPITAL, Rıfat Börekçi Caddesi No: 9

Çankaya. 06180, Ankara-Turkey

habibeozansoy@gmail.com

ORCİD : 0000-0001-9261-2669

Contribution: Writing - Review & Editing, Visualization

Fulya Keskin Elmas, M.D. Emergency Medicine Specialist

Ankara Bılkent Cıty Hospıtal, Rıfat Börekçi Caddesi No: 9, Çankaya. 06180, Ankara-Turkey

fulya005@gmail.com

Orcıd: 0009-0007-6310-0251

Contribution: Investigation, Resources

Yunus Ağıllı, M.D,

Emergency Department, Sincan Training And Research Hospıtal, m: gökçek mah. 250 cad.

2/A , 06100, ankara-Turkey

yunusaglli@gmail.com

Orcıd: 0009-0009-7183-4671

Contribution: Writing - Original Draft

Hakan Oguzturk, M.D, Professor

Emergency Department, health science university, 1604. street, 06800, ankaraTurkey

oguzturk@hotmail.com

Orcıd: 0000-0002-9800-1428

Contribution: Supervision, Writing - Review & Editing, Visualization, Methodology

References

1. Powers RD, Guertler AT. Abdominal pain in the ED: stability and change over 20 years. Am J Emerg Med. 1995;13(3):301-3. doi:10.1016/0735-6757(95)90204-X.
2. Graff LG 4th, Robinson D. Abdominal pain and emergency department evaluation. Emerg Med Clin North Am. 2001;19(1):123-36. doi:10.1016/S0733-8627(05)70171-1.
3. Gulati M, Levy PD, Mukherjee D, Amsterdam E, Bhatt DL, Birtcher KK, et al. 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR guideline for the evaluation and diagnosis of chest pain: executive summary: a report of the American College of Cardiology/American Heart Association

Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol. 2021 Nov 30;78(22):2218-2261. doi:10.1016/j.jacc.2021.07.052.

4. Backus BE, Six AJ, Kelder JC, et al. Chest pain in the emergency room: a multicenter validation of the HEART score. Crit Pathw Cardiol. 2010;9(3):164-9. doi:10.1097/HPC.0b013e3181ec36d8.
5. Backus BE, Six AJ, Kelder JC, et al. A prospective validation of the HEART score for chest pain patients at the emergency department. Int J Cardiol. 2013;168(3):2153-8. doi:10.1016/j.ijcard.2013.01.255.
6. Bulava A, Skvarilová M, Marek O, Lukl J. Elektrokardiografické změny u pacientů s akutní pankreatitidou. Kazuistika a prehled literatury [Electrocardiographic changes in patients with acute pancreatitis. Case report and review of the literature]. Vnitr Lek. 2001;47(6):407-10.
7. Yaylaci S, Kocayigit I, Genc AB, Cakar MA, Tamer A, Uslan MI. Electrocardiographic changes in patients with acute pancreatitis. Med J Dr DY Patil Univ. 2015 Mar-Apr;8(2):196-8. doi:10.4103/0975-2870.153159.
8. Patel N, Ariyarathenam A, Davies W, Harris A. Acute cholecystitis leading to ischemic ECG changes in a patient with no underlying cardiac disease. JSLS. 2011;15(1):105-8. doi:10.4293/108680811X13022985131534.
9. McCarthy BD, Beshansky JR, D'Agostino RB, Selker HP. Missed diagnoses of acute myocardial infarction in the emergency department: results from a multicenter study. Ann Emerg Med. 1993;22(3):579-82. doi:10.1016/S0196-0644(05)81945-6.
10. Larson DM, Menssen KM, Sharkey SW, et al. “False-positive” cardiac catheterization laboratory activation among patients with suspected ST-segment elevation myocardial infarction. JAMA. 2007;298(23):2754-60. doi:10.1001/jama.298.23.2754.
11. Oguzturk H, Turtay MG, Tekin YK, Tekin G. The evaluation of electrocardiogram findings in acute abdominal pain patients admitted to the emergency department. J Prim Care Community Health. 2011;2(3):163-6. doi:10.1177/2150131911403931.
12. Rubio-Tapia A, García-Leiva J, Asensio-Lafuente E, Robles-Díaz G, Vargas-Voráckova F. Electrocardiographic abnormalities in patients with acute pancreatitis. J Clin Gastroenterol. 2005;39(9):815-8. doi:10.1097/01.mcg.0000177241.74838.57.
13. Friedman AB, Chen AT, Wu R, et al. Evaluation and disposition of older adults presenting to the emergency department with abdominal pain. J Am Geriatr Soc. 2022;70(2):501-11. doi:10.1111/jgs.17503.
14. Pezzilli R, Bellacosa L, Barakat B. Abdominal pain and ECG alteration: a simple diagnosis? Adv Med Sci. 2010;55(2):333-6. doi:10.2478/v10039-010-0016-5.
15. DeVon HA, Mirzaei S, Zègre-Hemsey J. Typical and atypical symptoms of acute coronary syndrome: time to retire the terms? J Am Heart Assoc. 2020;9(7):e015539. doi:10.1161/JAHA.119.015539.
16. Pope JH, Aufderheide TP, Ruthazer R, et al. Missed diagnoses of acute cardiac ischemia in the emergency department. N Engl J Med. 2000;342(16):1163-70. doi:10.1056/NEJM200004203421603.

17. Meuleman VG, Schinkel AF, Vos J. Electrocardiographic abnormalities caused by acute pancreatitis. Neth Heart J. 2011;19(3):137-9. doi:10.1007/s12471-011-0072-x.
18. Ozeki M, Takeda Y, Morita H, et al. Acute cholecystitis mimicking or accompanying cardiovascular disease among Japanese patients hospitalized in a Cardiology Department. BMC Res Notes. 2015 Dec 19;8:805. doi:10.1186/s13104-015-1790-8.
19. Gu YL, Svilaas T, van der Horst IC, Zijlstra F. Conditions mimicking acute ST-segment elevation myocardial infarction in patients referred for primary percutaneous coronary intervention. Neth Heart J. 2008;16(10):325-31. doi:10.1007/BF03086173.
20. Poldervaart JM, Langedijk M, Backus BE, Dekker IMC, Six AJ, Doevendans PA, Hoes AW, Reitsma JB. Comparison of the GRACE, HEART and TIMI score to predict major adverse cardiac events in chest pain patients at the emergency department. Int J Cardiol. 2017 Jan 15;227:656-661. doi: 10.1016/j.ijcard.2016.10.080. Epub 2016 Oct 30. PMID: 27810290.
21. Bødker B, Kelbaek H, Jensen SM, Godtfredsen J. Electrocardiographic changes in patients with upper abdominal pain admitted to a surgical ward. Am J Cardiol. 1987 Nov 15;60(14):1188-9. doi:10.1016/0002-9149(87)90422-X.
22. Byrne RA, Rossello X, Coughlan JJ, et al. 2023 ESC Guidelines for the management of acute coronary syndromes. Eur Heart J. 2023 Oct 12;44(38):3720-3826. doi:10.1093/eurheartj/ehad191.