

Coronary angiographic findings in unstable angina in relation to Braunwald's clinical classification and resting ECG.

Dr. Ala Hussain Abbase Haider
A. Professor of Internal Medicine
Babylon University, College of Medicine
Dr. Hussein Zbala Essa Al-Husseini, M.B.CH.B
Dr. Hamid Majeed Abdalameer Thahab, M.B.Ch.B,DM

نتائج قسطرة الشرايين التاجية لدى مرضى الذبحة القلبية غير المستقرة و العلاقة مع التصنيف السريري لبراون وولد وتخطيط القلب الكهربائي في وضع الراحة

الخلاصة

مقدمة: تصلب الشرايين التاجية ومن ضمنه الذبحة القلبية غير المستقرة هو سبب رئيسي للأمراض و الوفيات في جميع أنحاء العالم.

يتمثل المريض عند مراجعته بعدة أعراض وعلامات سريرية مختلفة مع عدة أشكال من تخطيط القلب الكهربائي في وضع الراحة. دراسة هذه الأعراض و العلامات يزودنا بوسائل مفيدة لمعرفة الخطورة الحالية و النتائج المستقبلية.

أهداف الدراسة: هو دراسة لنتائج قسطرة القلب لدى مرضى الذبحة القلبية غير المستقرة و العلاقة مع التصنيف السريري لبراون وولد وتخطيط القلب الكهربائي في وضع الراحة.

موقع الدراسة: مستشفى ابن البيطار في بغداد و مستشفى مرجان التعليمي في بابل.

النتائج: انسداد الشرايين التاجية الثلاثي لدى ٤٤ مريض (٣٣.٨٤%).

صنف ١ و صنف A كان لديهم نسبة عالية من انسداد شريان واحد فقط (٥٧.٦٩ % ، ٤٦.٨٧ %) حسب الترتيب.

صنف ٢ صنف B اظهروا نسبة مئوية كبيرة من الإصابة بانسداد ثلاثة شرايين (٤٤.٨٧ % ، ٤٢.٣٧ %) حسب الترتيب.

صنف ٣ صنف C اظهروا نسبة مشوية كبيرة بانسداد شرياني (٣٨.٤٦ % ، ٤١.٠٢ %) حسب الترتيب.

أظهرت الدراسة إن المرضى الذين لم تظهر لديهم تغيرات في التخطيط الكهربائي اظهروا نسبة إصابة عالية بانسداد شريان واحد (٣٨.٥٠ %) كما إن المرضى الذين لديهم تغيرات في الموجة ST.T وموجة Q اظهروا نسبة إصابة كبيرة بانسداد ثلاثة شرايين قلبية (٤٠.٢٧ %).

كما أظهرت الدراسة بان هنالك زيادة في عدد الشرايين المصابة لدى المرضى الذين تحدث لديهم الأعراض والعلامات عند الراحة و المرضى الذين لديهم أمراض أولية في القلب.

الاستنتاجات: أغلب المرضى في هذه الدراسة لديهم إصابة بثلاثة شرايين تاجية أغلبهم هم صنف B (المرضى الذين لديهم إصابة أولية في شرايين القلب و صنف II (وهم المرضى الذين تحدث لديهم الأعراض خلال الراحة). المرضى الذين لديهم إصابة بشريان واحد صنف I (وهم الذين لهم أعراض في وضع الإجهاد ، و صنف A (وهم المرضى الذين لديهم أعراض نتيجة أمراض ثانوية في الجسم).

أيضا الإصابة بشريان واحد وجدت لدى المرضى الذين لديهم تخطيط قلب كهربائي طبيعي و الإصابات التي وجدت عند المرضى الذين لديهم تغيرات بموجة ST.T.

Abstract

Background : Atherosclerotic coronary artery disease including unstable angina is a major cause of high morbidity and mortality all over the world .Among patients with unstable angina there are different clinical presentation and resting electrocardiogram pattern at presentations ,analysis of these provide a useful means to stratify a present risk and subsequent out come .

Objectives : the objectives of this study were to study the angiographic findings of patients with unstable angina in relation to Braunwald's clinical classification and resting electrocardiogram pattern .

Setting: Ibn-Albaitar hospital and Marjan teaching hospital.

Method: Across-sectional study done,one hundred thirty patients with clinical presentation of unstable angina were classified according to Braunwald's clinical classification and resting electrocardiogram pattern and the results correlated with that of angiographic findings.

Results: Triple vessel disease occurred in 44 patients (33.84%). Class I and class A showed higher proportion of single vessel disease (57.69% ,46.87%) respectively. class II and class B showed higher proportion with triple vessel disease (44.87% , 42.37%) respectively. class III and class C showed higher proportion with double vessel disease (38.46%, 41.02%) respectively.

Patients with normal Electrocardiogram showed higher proportion with single vessel disease SVD (38.509%). Patients with electrocardiogram changes (ST-T segment changes and Q wave) showed higher proportion with triple vessel disease (40.27%).

Conclusion: Patients with unstable angina have high incidence of triple vessel disease, mostly in patients who have primary unstable angina (class B) or have unstable angina that occurs at rest (class II). Single vessel disease occurs more in patients who have new or accelerated exertional angina (class I) and secondary unstable angina (class A). Single vessel disease mostly occurs in patients who have normal electrocardiogram patients with unstable angina who have more extensive disease usually have S.T.T changes.

Key words: Coronary angiography, Unstable angina, Braunwald's clinical classification, Resting electrocardiogram.

Introduction

The definition of unstable angina is largely based on the clinical presentation.⁽¹⁾ Unstable angina is defined as angina pectoris (or equivalent type of ischemic discomfort) with at least one of (1) occurring at rest (or minimal exertion) and usually lasting > 20 minutes (if not interrupted by nitroglycerin administration), (2) being severe and described as frank pain, and of new onset (i.e, with in 1 month),(3) occurring with a crescendo pattern (i.e, more severe, prolonged , or frequent than previously).⁽²⁾

Thus unstable angina is abroad clinical diagnosis, occur in a hetrogenous population of patients , with a variety of clinical manifestation & outcome⁽³⁾ .

Eugene Braunwald who is a famous American Cardiologist had suggested a classification scheme based on the clinical presentation or progressive versus rest angina, contex (primary , secondary or post myocardial infarction),and therapy during symptoms ⁽⁴⁾, this has been found to be a useful means of stratifying the present risk and subsequent outcomes ⁽⁵⁾.

| everity | |
|------------------------------|---|
| Class | Definition |
| Class I: | New onset of severe angina or accelerated angina; no rest pain |
| Class II: | Angina at rest within past month but not within preceding 48 hr (angina at rest, subacute) |
| Class III: | Angina at rest within 48 hr (angina at rest, subacute) |
| Clinical Circumstances | |
| A. (Secondary Angina) | Develops in the presence of extracardiac condition that intensifies myocardial ischemia |
| B. (Primary Angina): | Develops in the absence of extracardiac condition |
| C. (Post Infarction Angina): | Develops within 2 wk after acute myocardial infarction |
| Intensity of treatment | Patients with unstable angina may also be divided into three groups depending on whether unstable angina occurs (1) in the absence of treatment for chronic stable angina; (2) during treatment for chronic stable angina; or (3) despite maximal anti ischemic drug therapy. These three groups that may be designated subscripts 1, 2, and 3, respectively. |

From Braunwald E: Unstable angina: A classification. Circulation 80:410-4, 198

The admission ECG is useful in predicting long term adverse outcome ⁽⁶⁾, and it is the first line assessment in any patient with clinical features of unstable angina , and usually obtained within ten minutes of patient arrival to hospital . This is important to certain the diagnosis ,allow the detection of risk level and plan further management ⁽⁷⁾ .The outcome in patients with abnormal ECG findings and in particular ST-T wave depression approximate that of patients with acute myocardial infarction ⁽⁶⁾.

The coronary angiography remains the standard for diagnosing coronary artery disease, a primary method to define the site, severity, morphology of lesions, also the coronary angiography helps to provide a qualitative assessment of coronary blood flow and helps to identify collateral vessels.

According to American college of cardiology/ American heart association guideline, unstable angina is one of the definite indication for coronary angiography ⁽⁸⁾

The objectives of this study are to study the coronary angiographic findings in patients with unstable angina and to correlate the findings with Braunwald's clinical classification and resting ECG changes.

Patients and Methods

Across – sectional survey was conducted on 130 patients who attended angiographic department in Ibn-Albaitar hospital (107 patients) and Marjan teaching hospital (23 patients) between April 2008 and September 2008.

Full history and physical examination was done to all patients including symptoms, duration, any precipitating factors for ischemic pain and treatment history

All patients full filled the clinical criteria for diagnosis of unstable angina before the intervention and they were classified according to Braunwald's classification .

All patients had repeated resting ECG before intervention

Coronary angiography was done using Philips , Integers Allura 9/12/15 equipment (Netherlands).

Qualitative assessment of the angiogram was done and interpreted visually during the procedure for the presence of vessel occlusion by trained experts .

The degree of luminal narrowing was recorded in percentage of prestenotic diameter , internal luminal narrowing of 70% was considered haemodynamically significant , except for left main stem artery in which 50% stenosis was regarded as haemodynamically significant because of prognostic significance ⁽⁹⁾.

The results were classified according to the number of vessels involved in to:

- No significant lesion .
- Single vessel disease .
- Double vessel disease .
- Triple vessel disease .
- Left main stem disease with or without other vessels .

The results of Braunwalds clinical classification correlated to that of angiographic findings and these include class I, II, III and class A,B,C.

As all patients belong to class 2 (which include usual oral anti angina therapy), the last subclass of Braunwald classification was not included in this study.

Also all patients classified according to resting ECG pattern in to 3 groups.

- 1- Normal ECG group .
- 2- ST.T wave abnormalities group .
- 3- Post infarction Q . wave pattern group .

Each group correlated with the angiographic findings.

The statistical analysis was performed using chi-square. Probability value (p-value)< 0.05 considered statistically significant.

Results

A total of (130) patients were included in this study (102 males , 28 females) , mean age was (52 \pm 6) years ranged from (27 – 77) years .

Table I

shows the coronary angiographic findings among whole patients ,triple vessel disease had the highest percentage 44 patients (33.84%) , and no significant lesion in 5 patients (3.83 %).

Table II

shows the severity of unstable angina according to the Braunwald's clinical classification in relation to coronary angiographic findings , class I had higher percentage with single vessel disease 15 patients (57.69%) , class II had higher

percentage with triple vessel disease 35 patients (44.87 %) , class III had higher percentage with double vessel disease 10 patients (38.46%) and most patients belong to class II 78 patients (60 %)

single vessel disease was significantly higher in class I as compared to class II (57.69 % vs 10.25%) $p < 0.01$ and class III (57.69 % vs 30.76%) $p < 0.05$.

Double vessel disease was significantly higher in class III as compared to class I (38.46% vs 15.38%) $p < 0.05$ but not significantly higher than class II (38.46% vs 26.92%) $p > 0.05$.

Triple vessel disease was significantly higher in class II compared to class I (44.87% vs 15.38%) $p < 0.01$ and class III (44.87% vs 15.38) $p < 0.01$.

Left main stem disease was not significantly higher in class II as compared to class I (12.02% vs 11.35) and class III (12.02% vs 11.53%) $p > 0.05$.

No significant lesion was significantly higher in class II as compared in class I (5.21% vs 0%) $p < 0.01$ and class III (5.21% vs 3.84%) $p < 0.01$.

Table III

Shows the clinical presentation of unstable angina\ according to Braunwald's clinical classification in relation to the angiographic findings .

Class A had higher percentage with single vessel disease(15 patients) (46.87%) .

Class B had higher percentage with triple vessel disease (25 patients) (42.37%) .

Class C had higher percentage with double vessel disease 16 patients (41.02%) .

Single vessel disease was significantly higher in class A as compared in class B (46.87% vs 10.16 %) $p < 0.01$ and class C (46.87% vs 25.64%) $p < 0.05$.

Double vessel disease was significantly higher in class C as compared to class A (41.02 % vs 21.87%) $p < 0.05$ and class B (41.02% vs 20.33 %) $p < 0.01$.

Triple vessel disease was significantly higher in class B as compared to class A (42.37% as 15.62%) $p < 0.01$ but not significantly higher than class C (42.37% vs 25.64%) $p > 0.05$.

Left main stem disease was not significantly higher in class A as compared to class B (15.62% vs 11.86%) and class C (15.62% vs 7.69%) $p > 0.05$.

No significant lesion only present in class B (8.47%) .

Table IV

Shows the ECG pattern in patients with unstable angina in relation to the angiographic findings. Normal ECG was present in 21 patients(16.21%), ST. T abnormalities was present in 72 patients (55.38%) ,and Q wave infarction pattern was present in 37 patient (28.46%) .

Normal ECG had higher percentage with single vessel disease 8 patients (38.50%) .

ST. T abnormalities had higher percentage with triple vessel disease 29 patients (40.27 %)

Q wave infarction pattern had higher percentage with triple vessel disease 13 patients (35.13%)

Single vessel disease was significantly higher in normal ECG pattern as compared to ST.T abnormalities pattern (38.09% vs 18.05%) $p < 0.05$ but not significantly higher than Q wave infarction pattern (38.09% vs 27.02%) $p > 0.05$.

Double vessel disease was not significantly higher in ST-T abnormalities as compared to normal ECG pattern (27.77 % vs 18.04%) $p>0.05$ and Q wave infarction pattern (27.77 % vs 12.50%) $p>0.05$.

Triple vessel disease was significantly higher in ST.T abnormalities as compared to normal ECG pattern (40.27% vs 19.04 %) $p<0.05$, but was not significantly higher than Q wave infarction pattern (40.27% vs 35.13%) $p>0.05$.

Left main stem disease was not significantly higher in Q wave infarction pattern as compared to normal ECG(13.51% vs 4.76 %) $p>0.05$ and ST-T abnormalities (13.51 vs 12.5% $p>0.05$.

No significant lesion was significantly higher in normal ECG pattern as compared to ST.T wave abnormalities (19.04 % vs 1.38%) $p<0.01$, and Q wave infarction pattern(19.04% vs 0 %) $p<0.01$.

Table I Coronary angiographic finding among whole patients

| Angiographic Finding | Number of Patients | Percentage % |
|---|--------------------|--------------|
| Single vessel Disease (SVD) | 31 | 23.846% |
| Double Vessel Disease (DVD) | 35 | 26.923% |
| Triple Vessel Disease (TVD) | 44 | 33.843% |
| Left Main Stem With/without other vessel disease (LMSD) | 15 | 11.538% |
| No Significant lesion | 5 | 3.836% |
| Total | 130 | 100% |

Table II The severity of unstable angina in relation to angiographic findings

P value < 0.001

| The Severity | Angiographic Findings | | | | | Total |
|--------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|-------------|
| | Single vessel disease | Double vessel disease | Triple vessel disease | Left main stem disease | No Significant lesion | |
| Class I | 15 57.69% | 4 15.38% | 4 15.38% | 3 11.35% | 0 0% | 26 20% |
| Class II | 8 10.25% | 21 26.92% | 35 44.87% | 10 12.02% | 4 5.21% | 78 60% |
| Class III | 8 30.76% | 10 38.46% | 5 19.33% | 2 11.53% | 1 3.84% | 26 20% |
| Total | 31 23.84% | 35 26.92% | 44 33.84% | 15 11.53% | 5 3.84% | 130 100% |

Table III The clinical presentation of unstable angina in relation to angiographic findings P value <0.001

| Classes | Angiographic Findings | | | | | Total |
|---------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|--------------|
| | Single vessel disease | Double vessel disease | Triple vessel disease | Left main stem disease | No Significant lesion | |
| Class A | 15 46.87% | 7 21.87% | 5 15.62% | 5 15.62% | 0 0% | 32 24.61% |
| Class B | 6 10.16% | 12 20.33% | 25 42.37% | 7 11.86% | 5 8.47% | 59 45.58% |
| Class C | 10 25.64% | 16 41.02% | 10 25.64% | 3 7.69% | 0 0% | 39 30% |
| Total | 31 23.84% | 35 26.92% | 44 33.81% | 15 11.53% | 5 3.84% | 130 100% |

Table IV Resting ECG pattern in patients with unstable angina in relation to angiographic findings . P value < 0.005

| Resting ECG pattern | Angiographic Findings | | | | | Total |
|---------------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|--------------|
| | Single vessel disease | Double vessel disease | Triple vessel disease | Left main stem disease | No Significant lesion | |
| Normal ECG | 8 38.509% | 4 18.04% | 4 19.04% | 1 4.76% | 4 19.04% | 21 16.21% |
| ST – T abnormalities | 13 18.05% | 20 27.77% | 29 40.27% | 9 12.5% | 1 1.38% | 72 55.38% |
| Q wave infarction pattern | 10 27.02% | 9 12.50% | 13 35.13% | 5 13.51% | 0 0% | 37 28.46% |
| Total | 31 23.84% | 35 26.92% | 44 33.84% | 15 11.53% | 5 3.84% | 130 100% |

Discussion

The diagnosis of unstable angina encompasses a broad spectrum of patients with myocardial ischemia, varying widely in cause, prognosis and responsiveness to therapy.

A new clinical classification of unstable angina is based on the following 3 components, severity, the clinical setting in which unstable angina develops and the unstable angina therapy, the hypothesis that this clinical classification correlates with the underlying coronary artery anatomy was tested⁽¹⁰⁾.

There are a wide spectrum of coronary angiographic findings exists in patients with clinically unstable angina⁽¹¹⁾.

There are variations in coronary angiographic findings between different studies. In the study of Zollei et al, the findings as follows: single vessel disease (23%), double vessel disease (38%), triple vessel disease (20%), left main stem disease (8%), no significant lesion in (11%)⁽¹²⁾. In the study of Kanojia et al, the findings as follows: single

vessel disease(23%), double vessel disease (14%), three vessel disease (44%), left main stem disease (5%) and no significant lesion in 14% ⁽¹³⁾.

In TIMI IIIB trial the findings as follow :single vessel disease found in 38%, double vessel disease found in 29%,triple vessel disease found in 15%, left main stem disease found in 4%, no significant lesion found in 19% ⁽¹⁴⁾.

Compared to the different studies this study agrees with the studies that show large proportion of triple vessel disease and/ or left main stem disease, this probably because of delay of referral of patients and long history of disease of patients under went this study . Non significant lesion occurred less in this study compared to other studies probably due to limitations of coronary angiography for more critical patients.

Non significant lesion occurred in 5 patients (3.84%), this because some patients have incorrect diagnosis ⁽⁶⁾ or coronary spasm might be responsible ^(6,15), in the remainder the spontaneous lysis of a thrombus , abnormalities of the micro vascular circulation, or presence of a lesion that was over looked on coronary angiography ⁽⁶⁾.

In this study it was found that single vessel disease was more prevalent in patients with class I, 15 patients (57.69%), (table II) than other classes, where as more extensive disease found in other classes.

This result come in agreement to that of Calton R. et al who found that single vessel disease was more prevalent in class I (47%) than other classes (class II (23%) class III (20%) with significant p- value and this reflect that severity of symptoms correlates with numbers of vessels involved ⁽¹⁶⁾.

In this study single vessel disease was more prevalent in class A (46.87%) than class B and C (10.16% , 25.64 %) respectively (Table III) , while more extensive disease occurred in class B triple vessel disease (42.37%) this result comes in agreement to that study of Ruppercht HJ et al who found that more extensive disease best identified by clinical features of recent onset primary unstable angina or abnormal ECG changes ⁽¹⁷⁾. This probably because class A had predisposing factors for development of angina symptoms while primary (class B) reflect the actual angina symptoms without predisposing factors .

In this study more extensive disease was found in ST-T wave abnormalities in ECG pattern (table IV) (72 patients 55.38%) and most changes associated with triple vessel disease (29 patients 40.27%) this result comes in agreement with the study of Plotnick GD et al whom found that with increasing ECG abnormalities , there was tendency to both more extensive coronary disease and greater depression of left ventricular function ⁽¹⁸⁾.

Other study by zhonghua found that an abnormal ECG was the single predictive clinical indicator of three vessel disease and cardiac event i.e patients with abnormal ST-T segment represent a high risk of triple vessel disease and cardiac events ⁽¹⁹⁾.

In this study 21 patients had normal ECG (16.15%), 17 of them had coronary artery involvement and that mean normal ECG doesn't exclude significant coronary artery disease.

Conclusions

- 1- There are different angiographic findings among patients with unstable angina .
- 2- There are high prevalence of single vessel disease in patients with class I and class A (secondary unstable angina).
- 3- There are more extensive disease among patients who have clinical features of unstable angina (class II, III), or have primary U/A class B and post infarction angina class C .

- 4- There are more extensive disease in patient who had ST-T wave abnormalities in resting ECG .
- 5- Normal ECG doesn't exclude serious coronary artery involvement .
- 6- Most patients have extensive disease in our study , this might indicate delay in referral to tertiary centers .

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