Correlation of Angiographic Findings and Clinical Presentations in Unstable Angina

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ABSTRACT:

BACKGROUND:

Unstable angina is usually related to acute thrombosis superimposed on a disrupted plaque. The highest; level of Braunwald classification of unstable angina can be used to assess the severity of clinical presentation. However the highest classes have not been directly correlated with thrombotic and complex lesions.

OBJECTIVE:

The study was done to clarify the correlation between angiographic findings and the most acute and / or severe clinical presentation in unstable angina.

PATIENTS AND METHOD:

We conducted a prospective study of 110 patients of unstable angina at Ibn-Albitar Center for Cardiac Surgery. All of these patients underwent cardiac catheterization, culprit lesion was identified in 80 patients and in 30 patients there was no an identifiable culprit lesion .Complex lesions including complex morphology, intracoronary thrombus, or total occlusion were also quantitatively analyzed and Thrombolysis in Myocardial Infarction (TIMI) flow grade was assessed. Patients were classified according to Braunwald classification in instable angina .We compared patients with and those with no culprit lesions in regarding Braunwald classification. We sequentially compared the highest Braunwald classes II, C, 3 with classes <III, < C, <3 respectively regarding the angiographic findings in patients with culprit lesions.

RESULTS:

Patients with culprit lesions were strongly associated with highest Braunwald classes regarding clinical circumstances and intensity of treatment as compared to those with no culprit lesion “p value <0.01 “. In patients with culprit lesions the angiographic findings were 14 (17.5%) intracoronary thrombus, 12(15%) total occlusion, 24(30%) TIMI flow <3, and 40(50%) were complex, lesions. Class III was correlated with TIMI <3 in 18(41.84%) “P< 0.05”, class C in 11(55%) “P value < 0.01” and class 3 in 14 (43.47%) “P value <0.05”.

CONCLUSION:

Highest Braunwald classes, recent rest chest pain (class III),post infarction angina (class C) and refractory angina(class 3) were strongly correlated with decreased TIMI flow grade <3.

KEYWORDS: braunwald classification , unstable angina

INTRODUCTION:

Unstable angina "U.A." accounts for more than one million hospital admissions annually in USA [1,2] ;6 to 8 % with this condition have nonfatal myocardial infarction "M.I." or die within the first year after diagnosis [3,4]. Various definitions of unstable angina have been proposed, but in 1989, Braunwald devised a classification system to ensure uniformity of categorization, as well as diagnostic and prognostic information [5,6]. Braunwald classification was introduced to subdivide the patients with unstable angina according to the clinical characteristics and to provide better prognostic stratification [6,7]. The complexity of classification reflects the extent of clinical diversity of patient with unstable angina. The validity of particular classification system to predict patient outcome has been recently investigated [7,8].

Pathogenesis 1-Initiation of the cascade of plague fissure and rupture[9]. 2-Acute thrombosis and platelets aggregation[10,11]. 3- Coronary vasospasm[12]. 4- Erosion of coronary plague without rupture [13,14].

Prognosis:

Increasing (accelerated) angina without rest pain appears to be more benign condition than rest pain

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angina. [13,15]. In the present study we tried to correlate the angiographic findings with patient level of symptoms using each of the higher Braunwald classes as a measure of the acuteness or severity or both of clinical presentation of unstable angina.

PATIENTS & METHODES:

A prospective study of 110 patient with unstable angina admitted to coronary care unit at Ibn-Albitar Center For Cardiac Surgery during 18 months period. The patients were interviewed on the day of angiography and their charts were reviewed to confirm the referring diagnosis and to identify the localization of ECG changes during chest pain episodes .However the assignment of Braunwald classes was done at the day of admission and at the time of coronary angiography few days later. The diagnosis of unstable angina was done as angina pectoris (or equivalent type of ischemic discomfort) with at least one of the following: 1-It occur at rest (or with minimal exertion), usually lasting more than 20 minutes (if not interrupted by nitroglycerine). 2-It is severe and described as frank pain and of new onset (within one month). 3-It occurs within a crescendo pattern (more severe , prolonged, or frequent than previously). Patients were classified according to the Braunwald classification.

BRUANWALD CLASSIFICATION:

Severity*: *Class I (exertional angina, new onset, severe, or accelerated angina, angina of less than 2 months duration, more frequent angina, no rest angina, in last two months.) ***Class II*** (rest angina, sub acute. rest angina within the last month but not within 48 hours of presentation.) ***Class III*** (rest angina, acute. rest angina within 48 hours of presentation.).

ClinicalCircumstances: ***Class A*** (Secondary unstable angina; Precipitated by extrinsic conditions e.g. fever, infection, tachyarrhythmia, thyrotoxicosis and anemia.) ***Class B*** (Primary unstable angina.) ***Class C*** (Post-myocardial infarction angina; within 14 days of documented myocardial infarction.).

Intensity of Treatment: ***Class 1*** (without treatment or minimal treatment "i.e. only aspirin and one class of antianginal agents".) ***Class 2*** (standard treatment for chronic stable angina "nitroglycerin, B- blockers, calcium channel blockers".) ***Class 3*** (refractory to maximal medical therapy including intravenous nitroglycerin and heparin.)

coronary cathetrization :

All patients underwent diagnostic coronary angiography with the transfemoral approach using Judkin's technique. The procedure was performed within 72 hours of presentation to the hospital. All obstructive lesions were visualized in at least two orthogonal views.

Qualitative morphological analysis and quantitative coronary angiography of all angiograms were performed. In each case we attempted to identify the ischemia related artery and a culprit lesion with a visual diameter stenosis of more than 70% on the bases of anatomy alone or localization of ECG changes with pain or both. To provide a level of standardization for comparison of various regimens, most investigators describe the flow in the infarct-related vessel according to the Thrombolysis in Myocardial Infarction "TIMI" grading system [16]. We graded the intra-arterial (coronary) flow according to the TIMI.

timi grading system:

Grade 0 (Complete occlusion of the infarct related artery.) ***Grade 1*** (Some penetration of the contrast material beyond the point of obstruction but without perfusion of the distal coronary bed.) ***Grade 2*** (Perfusion of the entire infarct vessel into the distal part, but with delayed flow compared with a normal artery.) ***Grade 3*** (Full perfusion of the infarct related vessel with normal flow.)

culprit lesion identification:

All culprit lesions should have at least 70% visual diameter stenosis (significant coronary disease).[17,18] In the absence of such lesion, the patient was excluded from subsequent analysis because a culprit lesion was not identified. In patient with single vessel disease, the ischemia-related (culprit) artery was considered to be the diseased vessel. In patient with multivessel disease, the culprit vessel was identified by coronary anatomy or localization of ECG changes with pain or both. In cases where there were more than one obstructive lesion in the ischemia-related vessel, the culprit lesion was considered to be the most severe narrowing or the lesion with complex morphology or intracoronary thrombus or both .If there were no ECG changes, the culprit lesion was considered to be the complex lesion or lesion with angiographic thrombus or both.

ANGIOGRAPHIC MORPHLOGY:

All the angiographic films were reviewed for analysis of coronary morphology. A complex lesion included the presence of a stenosis that was usually but not always eccentric, with ulceration, irregular border or overhanging edges[10].

Intracoronary thrombus was defined as a filling defect proximal or distal to the culprit lesion , visible on multiple projection with at least 3 edges surrounded by contrast agent [18].Total occlusion and Intracoronary thrombus were considered complex lesions , but were also classified as separated angiographic variables in our analysis for comparison with other studies.

Base line characteristic of all patient were described, and a groups of patients with and without an identified culprit lesion were compared. The group of patients with identifiable culprit lesion was further analyzed to correlate the acuteness or severity or both, of their clinical presentation with presence of angiographic findings. In the present study, acute or severe clinical presentation was assessed by each of the Braunwald class categorical variables.

All data were arranged in numbers and percentages .Associations between different variables were measured by using Chi-square test and Fisher's exact test when it is appropriate.

RESULTS :

table 1, demonstrates the characteristics of unstable angina groups. Total number of the patient was 110. Those with culprit lesion were 80 {58 "72.5%"male and 22 "27.5%" female} , those with no culprit lesion were 30 {18 "60%" male, 12 "40%" female}. ***Table 2*** shows the numbers of patients with culprit lesion who had their characteristics angiographic findings. The largest number was those with complex lesion, 40 "50%". Intracoronary thrombus was in 14 "17.5%" and total occlusion in 12 "15%". Both of these findings were included with complex lesion. TIMI <3 was found in 24 "30%". ***Table 3*** compares unstable angina patients with and those with no culprit lesion regarding each Braunwald classes. Regarding clinical circumstances, and the intensity of treatment, the difference between both groups reached a statistical significance "p value < 0.01". Subsequent analysis of culprit lesion patients was shown in ***table 4***. There was no significant correlation of Thrombus, Complex lesion and total Occlusion when compared in both groups. TIMI < 3 is the only angiographic finding that showed significant correlation between highest Braunwald classes (Class III, C, 3) and less severe classes' p value < 0.05.

DISCUSSION:

The number of patients who had culprit lesion and those with no culprit lesion was compared according to the Braunwald classes. Most of our patients was with more severe angina "recent rest angina, class III in unstable angina with culprit lesion and 53.33% in no culprit lesion, and comparing this finding to the results of TIMI-B registry [19,20]; we found that only 5% of unstable angina patient was in class III and this may be due to late referral of our patients to a more specialized cardiac centers or the patients seek medical advice later. There was statistically significant difference between patients with culprit lesion and those with no culprit lesion according to Braunwald classes. This is due to increasing number of patients who were refractory to maximal treatment and having primary unstable angina in group of culprit lesion. The type of lesions are more complicated and significant (.70% stenosis) in unstable angina with culprit lesion.

In the TIMI III a study of 391 patients with unstable angina were enrolled and underwent coronary angiography, 14% had no significant major coronary artery stenosis [21,22,23],. This is much less than in this study "27.28% ".This is due to shortage of non-invasive facilities which are hardly needed for clinical risk stratification in hospitals that referred the patients. Angiography is specific but insensitive for detection of intracoronary thrombus[23,24,25]. Intravascular ultrasound "IVUS" is more sensitive than angiography for detection of intracoronary thrombus because it detects smaller thrombi not seen angiographically [23,24,25,26,27]. However, angiography is relatively specific for detection of intracoronary thrombus in comparison with IVUS [22,23,24,25,28]. In this study and as a part of general angiographic policy in our cardiac catheterization laboratory, IVUS was used for only highly selected cases. We tried to minimize this limitation by restricting the study to those unstable angina patients that should be associated , because of their acute or sever presentation with larger angiographically detectable intracoronary thrombus .Therefore the clinical associations of such angiographic findings in unstable angina have been appropriately sought in the most severe and acute clinical presentation.

The clinical heterogeneity of unstable angina makes the Braunwald classification to be a complicated one, although it provided the appropriate clinical system for this analysis. In the present study we used the highest level of Braunwald classification as markers of acute or severe clinical presentation. We tried to correlate the frequency of complex lesion or intracoronary thrombus or both with the presence of such highest classes. Absence of significant relation of such

angiographic findings to be statistically significance with such highest classes may imply a lower degree rather than the absence of intracoronary thrombus (with limitation in IVUS usage), or may be due to aggressive regimen of maximal medical treatment including intravenous infusion of heparin, even sometimes in lower classes. In this study, an association was demonstrated between the most acute or sever clinical presentation as described by the individual highest Braunwald classes (III C3,) and angiographic findings, even if statistical significance was not reached in some variables. The absence of such significant statistics was due to insufficient number of patients. Decreased TIMI flow grade was statistically significant in highest classes (III C3) which may be due to a higher number of patients in such classes in whom TIMI flow grade <3 was present. In addition to that, TIMI flow grade <3 included a wide range of lesions that are significant leading to increase the number of patients regarding this variable. Decrease TIMI flow proved to be important correlate of acute presentation of highest classes (III C3) and the presence of any decrease in TIMI flow <3, appear to be responsible for significant association with highest classes (III C3). George P *et al* [29] studied the angiographic morphology of 284 patients with unstable angina; culprit lesion was identified in 200 patients. In that study Class III was associated with complex lesions and decrease TIMI flow , class C angina correlated with complex lesion, intracoronary thrombus and decrease TIMI flow grade, and class 3 angina was associated with intracoronary thrombus and TIMI <3. This discrepancy with our study is likely to be explained by two facts: a large number of patients included in that study and the fact of the use of angioscopy.

CONCLUSION:

We concluded that recent rest pain, post-infarction and refractory angina are strongly correlated with decreased TIMI flow grade. We recommend the use of IVUS in patients with unstable angina especially for those with the most acute and /or severe (highest Braunwald classes) clinical presentation, in order to detect intracoronary thrombus which may affect mode of intervention.

Table 1: Demographic characteristics of unstable angina

Characteristics	Patient Groups Total No. =110	
	Culprit Lesion No.= 80 (72.72 %)	No Culprit Lesion No.= 30 (27.28 %)
SEX Male	58(72.5%)	18 (60%)
Female	22 (27.5%)	12 (40%)
Age Range	31 —73	33—75
Mean	59.84	57.65

Table 2 : Distributions of angiographic findings in patients with culprit lesion

Angiographic findings	No. = 80	(%)
Intracoronary thrombus (ICT)	14	17.5
Total occlusion (TO)	12	15
TIMI < 3	24	30
Complex Lesion (CL)	40	50

Table 3: Associations of braunwald classes in patients with and with no culprit lesions severity

Braunwald Class	Culprit lesion No. (%)	No Culprit lesion No.(%)
I	17(21.25)	6(20)
II	20(25)	8(26.67)
III	43(53.75)	16(53.33)
total	80(100)	30(100)

P value 0.999

Clinical Circumstances

Braunwald Class	Culprit lesion No. (%)	No Culprit lesion No.(%)
A	0	2(6.67)
B	60(75)	15(50)
C	20(25)	13(43.33)
total	80(100)	30(100)

P value<0.01

Intensity of treatment

Braunwald Class	Culprit lesion No. (%)	No Culprit lesion No.(%)
1	18(22.5)	15(50)
2	30(37.5)	11(36.67)
3	32(40)	4(13.33)
total	80(100)	30(100)

P value < 0.01

Table 4: Association of highest braunwald classes with angiographic findings in patients with culprit lesion.

Severity

Angiographic findings	Class I &II No. = 37(%)	Recent rest angina Class III No. =43(%)	P value
Intracoronary thrombus (ICT)	6(16.2)	8(18.5)	Ns
Total occlusion (TO)	5(13.51)	7(16.28)	Ns
TIMI < 3	6(16.2)	18(41.84)	P < 0.05
Complex Lesion (CL)	15(40.5)	25(58.14)	Ns

Clinical Circumstances

Angiographic findings	Class B No. = 60(%)	Post infarction angina Class C No. =20(%)	P value
Complex Lesion (CL)	26(43.34)	14(70)	Ns
Intracoronary thrombus (ICT)	8(13.33)	6(30)	Ns
TIMI < 3	13(21.67)	11(55)	P < 0.01
Total occlusion (TO)	8(13.33)	4(20)	Ns

ANGIOGRAPHIC FINDINGS

Intensity of Treatment

Angiographic findings	Class 1 &2 No. = 48(%)	Refractory unstable angina Class 3 No. =32(%)	P value
Intracoronary thrombus (ICT)	6(12.5)	8(25)	Ns
Total occlusion (TO)	5(10.42)	7(21.87)	Ns
TIMI < 3	10(20.83)	14(43.74)	P < 0.05
Complex Lesion (CL)	22(45.83)	18(56.25)	Ns

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