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The novel relationship between some hematological, immunological and coagulation factors in patients with hyperlipidemic coronary artery ectasia and control group (case control study) : Prevention is better than treatment

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Abstract

Background: Ectasia of coronary artery (CAE) is defined as ectatic segment diameter of the vein one and half times been larger as in comparison to an neighboring good health artery. When the MPV is increase in cardiac disease with atherosclerosis, especially in infarction of heart , it might reflect platelet reactivity, [14]. The platelet counts and MPV, c-reactive protein (high sensitivity) (Hs-CRP) in addition tp interleukin-6 (IL-6) might have an association with diseases pathophysiology and subsequent inflammation. In our study we want to inspect a cost effect parameters comparatively and routinely existing inflammatory marker, that is IL-6 , Hs-CRP , PDW, MPV and MPV/PLT in patients with CAE.

Patients and Methods: A number of 80 patients who had hyperlipidemic CAE and 80 apparently healthy control were included in this study during period between January 2022 and May 2024 who consulted Al-Rabea Cardiac Center in Nassiryia Province and Al-Sulaymania Cardiac Center for coronary angiography and percutaneous cardiac intervention. Assessment of the white blood cells, hemoglobin, hematocrit, platelet counts and MPV, Hs-CRP and IL-6 ,PDW & MPV/PLT, in hperlipidemic patients with CAE and compared to appearntly healthy control group in case control study.

Results: It was found that there is no significant changes in relation to white blood cells, hemoglobin, hematocrit and platelet counts in hyperlipidemic patients (9.05 ± 1.77; 12.72 ± 1.93 ; 43.72 ± 4.66 & 254.82 ± 45.22) in comparison to control group (8.32 ± 1.88 ; 12.22± 1.88 ; 42.54 ± 4.12 & 285.63 ± 39.88) respectively (P value > 0.05). Also this study showed that there was significant relationship in regard to hs-CRP , IL-6, PDW % MPV, MPV/Plt in hperlipidemic patients (2.3 ± 0.5; 6.11 +/- 2.46; 19.82 ± 1.66; 19.82 ± 1.66; 8.99 ± 1.28 &0.03±0.0) and control group (0.8 ± 0.3; 4.22 +/- 0.64; 17.92 ± 2.43; 7.41 ± 0.76 &0.02 ± 0.02) respectively (P value < 0.05)

Conclusions: We can conclude from this study, the MPV ,PDW and MPV/Platelts ratio hs-CRP and IL-6 might use as a helpful easily available not expensive laboratory biomarker for screening and follow up of patients with CAD patients with hyperlidemia for risk of development of CAE as these

parameters might reflect increased platelet activation and aggregation and subsequent CAE and thrombus formation and these parameters may carry further practical therapeutic implications

Key words: coronary artery ectasia, MPV, MPV/Platelet, hs-CRP, IL-6, PDW

Introduction

CAE is an ectatic segment diameter of the being one and half times been larger as in comparison to an neighboring good health artery (1) CAE was detected in about 1-5% of all patients in department of coronary angiography [2]. Up to around 20% of cases of cases of CAE are been congenital, and 10 % to 20 % of cases of CAE are related with other diseases that is inflammatory in nature or may be associated to inflammatory events[3]. CAE is commonly synchronized with disease of coronary artery (CAD) that it is atherosclerotic in nature[4], that reflect is the principal reason and effect of CAE, that had analogous appearances in histopathology with low-grade inflammation nature in vascular system[5]. A earlier study proposed that an inflammation which is severe in its nature might be included in CAE aetiopathogenesis [6]. In addition to that , CAE has another features like diminished blood flow in coronary artery , filling delay of contrast media, and contrast media retention inside the ectatic coronary part [7 ,8]. myocardial perfusion abnormalities and reduced coronary flow reserve might be linked with isolated diffuse CAE [9&10]. One of the most severe complications of CAE is formation of thrombus and embolization of distal coronary artery and vasospasm [11]. Activation of platelet and increase total count of platelat may be important part in inflammatory process in CAE aetiopathogenesis. A more thrombotic risk was found when there was platelet with large volume [12] and in acute infarction of myocardium it was found that when there was coronary thrombus of massive nature the MPV was increased and it is regarded as independent predictive factor [13]. As there is increase in MPV , it have hemostatic important consequence, as it linked by additional platelets activity [12]. When the MPV is increase in cardiac disease with atherosclerotic process, particularly infarction of myocardium ,it might reflect platelet reactivity, [14]. The platelet counts and MPV, Hs-CRP and IL-6 might have an association with diseases pathophysiology and subsequent inflammatory process. The MPV/PLT ratio might been considered as a new chematological biomarker as increased MPV/PLT ratio was associated with mortality due to heart disease of long term in non- ST elevation myocardial infaraction patients than platelet or MPV alone [15]. In our study we want to inspect a cost effect parameters comparatively and routinely existing inflammatory marker, that is IL-6 , Hs-CRP ,PDW MPV and MPV/PLT in CAE patients.

Materials and Methods

A number of 80 patients were enrolled with ethical approval . This is case control study and patient who consulted Al-Rabea Cardiac Center in Nassiryia Province and Al-Sulaumania Cardiac Center for coronary angiography and percutaneous cardiac intervention . A total of 80 hyperlipidemic patients with isolated CAE and 80 age sex match control with normal coronary artery and normal lipid profile . History , physical examination and Echostudy were done for all patients with CAE. The ejection fraction of left ventricle (LVEF) was detected agreeing with method of Simpson [16].we exclude patients with acute coronary syndromes (ACS), anemia, inflammatory diseases, autoimmune or neoplastic disease ,previous coronary artery bypass grafting, abnormal thyroid function tests, congenital heart disease, a history of PCI , heart disease of valvular type , uncontrolled hypertension , thrombocytopenia, renal or hepatic abnormalities (creatinine if it was more than one and half mg/dL, aspartate aminotransferase & also alanine tranaminase more than two upper normal, correspondingly), acute or chronic infection, dysfunction of left ventricular (EF < 50%) or myocardium hypertrophy, a known malignancy hemolytic failure, DM, and any treatment that might affect the assessment of MPV/PLT ratio. The coronary angiography indication was positive stress test or the existance of typical angina . Elective coronary artery angiography was done for all patients with

CAE while the control group was those that are age and sex matched with negative CAE angiography. Coronary angiograms were performed via a distal radial artery. The CAE was considered if coronary artery dilatation was > 1.5-time adjacent normal coronary vessels diameter [17,18]. The Markis, etal. CAE classification was apply in this procedure [4]. Before coronary angiography and after 20 minutes of supine rest, blood samples were taken for laboratory analysis in hematological tube with EDTA (ethylene diamine tetraacetate acid) in addition to plain tube . Automatic blood counter for analysis of all blood samples was used immediatly. Hb %, WBC.s Plt ,PDW and MPV were analyzed . The ratio of MPV to Plt was calculated. Plain tubes was lefted to clot for 30 minute and centrifugation was done for assessment of hs-CRP and IL-6. SPSS softwar 18 for window was used for statistical measures and the mean ±standard deviation (SD) was used for normal distribution variables with the use of student's T test and $P < 0.05$ was considered as statistically significant.

Results

parameter	CAE	Controlled group	P value
White blood cell count (103/mm3)	9.05 ± 1.77	8.32 ± 1.88	> 0.05
Hemoglobin (g/dL)	12.72 ± 1.93	12.22± 1.88	> 0.05
Hematocrit (%)	43.72 ± 4.66	42.54 ± 4.12	> 0.05

Table (1): Some hematological factors in patients with CAE and control groups

parameter	CAE	Controlled group	P value
Hs-CRP (mg/l)	2.3 ± 0.5,	0.8 ± 0.3	<0.05
Interleukin-6(pg/ml)	6.11 +/- 2.46	4.22 +/- 0.64	<0.05

Table (2): Some immunological factors in patients with CAE and control groups

parameters	CAE	Controlled group	P value
Platelet count (103/mm3)	254.82 ± 45.22	285.63 ± 39.88	> 0.05
Platelet distribution width, %	19.82 ± 1.66	17.92 ± 2.43	<0.05
Mean platelet volume, fL	8.99 ± 1.28	7.41 ± 0.76	<0.05
MPV/PLT	0.03±0.01	0.02 ± 0.02	<0.05

Table (3): Some coagulation parameters in patients with CAE and controlled group

Discussion

Up to what we know about this subject, this is considered the first study that express the hi-CRP , IL-6 ,MPV, MPV and MPV/PLT ratio were significantly associated with hyperlipidemia and CAE. The current study clarifies the pathophysiology of CAE and exactly proposes that inflammation is at least between the influential reasons. The suggestion for the etiopathogenesis of CAE is linked with dysfunction of vascular endothelium and inflammatory process [19]

- Table (1) showed that there was no significant relationships between patients with CAE and controlled group in regard to hemoglobin, hematocrit and white blood cells counts (p value <0.05). This is

consistent with other study which showed no significant relationships in patients with CAE and control. This study is consistent with other study[20]

Table (2) showed that there was significant increase in hs-CRP and IL-6 in patients with hyperlipidemia and CAE in comparison to control group (P value <0.05). High CRP might contribute to pathology and thrombosis of CAE. Fan CH et al in his study showed that rosuvastatin usage for 6 months leads to reduction of Il_6 and CRP [21]. We can conclude that rosuvastatin-have a very strong effect as anti-inflammatory drug that reduced IL-6 and CRP ,so this might be of strong benefit in preventing development of future CAE in hyperlipidemic patients.

Taking into account that all the infective and inflammatory diseases were excluded, so inflammation is important part of CAE pathology in addition to that this inflammatory process can be antagonized by medication. This might lead to conclusion that early anticipation of CAE in hyperlipidemic patients by screening test may lead to prevention of CAE and prevention is better than treatment.

We conclude that the screening of patients with hyperlipidemia with hs-CRP and IL-6 might be helpful predictive easily aviable biomarker for CAE and the early use of statin as anti-inflammatory might be helpful prophylactic measure to prevent the development of CAE.

Table (3) showed that the platelet count was not differ significantly among patients with CAE and control group(P value > 0.05) while there were significant difference in regard to MPV, PDW and MPV/platelet count (p value <0.05).
Asoğlu (2019)[20] showed that there was significant relation of MPV/platelets ratio to CAE. Also It was shown that the MPV/PLT ratio was more accurate than MPV alone in ACS pathogenesis and the ratio reflect increased 4 years mortality[15]. Bolat, et al. study showed that MPV Plt ratiohas significant prognostic effect in MI with ST-segment elevation with PCI [18].
It was found that the CAE was associated with inflammation and endothelial vascular dysfunction[19]. AS Platelets play an important role in the processes of coagulation, inflammation, and immune response. Platelet distribution width (PDW) reflects variability in platelet size, and is considered a marker of platelet function and activation[20].
In this study there was significant increase in PDW in hyperlipidemic patients associated with CAE in comparison to control group (P value <0.05) ,so PDW can be regarded as useful non expensive easy and available laboratory marker of platelet activation in patients with hyperlipidemia associated with CAE

Conclusion

We can conclude from this study, the MPV ,PDW and MPV/Platelts ratio hs-CRP and IL-6 might use as a helpful easily available not expensive laboratory biomarker for screening and follow up of patients with CAD patients with hyperlidemia for risk of development of CAE as these parameters might reflect increased platelet activation and aggregation and subsequent CAE and thrombus formation and these parameters may carry further practical therapeutic implications

References

1-R Ross(1999). Atherosclerosis-an inflammatory disease. N Engl J Med 14;340(2):115-26.
2- Libby P(2003). Vascular biology of atherosclerosis: overview and state of the art. Am J Cardiol ;91(3A):3A-6A.
3-Usama Boles , Anders Johansson , Urban Wiklund , Zain Sharif , Santhosh David , Siobhan McGrory , Michael Y Henein (2018). Cytokine Disturbances in Coronary Artery Ectasia Do Not Support Atherosclerosis Pathogenesis.Int J Mol Sci ;19(1):260.

4-Markis J E, Joffe C D, Cohn P F, Feen D J, Herman M V, Gorlin R (1976).Clinical significance of coronary arterial ectasia.Am J Cardiol ;37(2):217-22.
5- Befeler B, Aranda M J, Embi A, Mullin F L, El-Sherif N, Lazzara R(1977). Coronary artery aneurysms: study of the etiology, clinical course and effect on left ventricular function and prognosis Am J Med ;62(4):597-607.
6- Turhan H, Erbay A Z, Yasar A S, Balci M, Bicer A, Yetkin E (2004). Comparison of C-reactive protein levels in patients with coronary artery ectasia versus patients with obstructive coronary artery disease .Am J Cardiol 15;94(10):1303-6.
7-Wang Y, Wang Y, Yin D, Dou K, Wu Y, et al. (2017) The beneficial effects of renin-angiotensin system blockades on two-year's outcomes in coronary artery ectasia patients.Curr Med Res Opin 33: 1677-1684.
8-Yalcin AA, Akturk IF, Celik O, Erturk M, Hancer VS, et al(2014) .(Coronary artery ectasia is associated with the c.894G>T (Glu298Asp) polymorphism of the endothelial nitric oxide synthase gene .Tohoku J Exp Med 232: 137-144
9-Gulec S, Atmaca Y, Kilickap M, Akyürek O, Aras O, et al. (2003). Angiographic assessment of myocardial perfusion in patients with isolated coronary artery ectasia. Am J Cardiol 15;91(8):996-9
10-Akyürek Ö, Berkalp B, Sayın T, Kumbasar D, Kervancıoğlu C, et al. (2003). Altered coronary flow properties in diffuse coronary artery ectasia Am Heart J;145(1):66-72.
11- Gziut AI, Gil RJ (2008). Coronary aneurysms. Pol Arch Med Wewn 118: 741-746.
12-Gasparyan AY, Ayvazyan L, Mikhailidis DP, Kitas GD(2011).Mean platelet volume: A link between thrombosis and inflammation? Curr Pharm Des 17: 47-58.
13-Lai H, Xu R, Yang Y, Ma Y, Li X, et al. (2015) Association of mean platelet volume with angiographic thrombus burden and short-term mortality in patients with ST-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention. Catheter Cardiovasc Interv ;85: 724-433.
14-Cameron H, Phillips R, Ibbotson R, Carson P (1983) Platelet size in myocardial infarction. Br Med J Clin Res Ed; 287:449-51.
15- Azab B, Torbey E, Singh J, Akerman M, Khoueiry G, et al(2011). (Mean platelet volume/platelet count ratio as a predictor of long-term mortality after non-ST-elevation myocardial infarction. Platelets 22: 557-566.
16-Schiller NB, Shah PM, Crawford M, DeMaria A, Devereux R, et al. (1989) Recommendations for quantitation of the left ventricle by two-dimensional echocardiography. American society of echocardiography committee on standards subcommittee on quantitation of two-dimensional echocardiograms. J Am Soc Echocardiogr 2: 358-367.
17- Hartnell G, Parnell B, Pridie R (1985) Coronary artery ectasia. Its prevalence and clinical significance in 4993 patients.Br Heart J 54: 392-395.
18-Bolat I, Akgul O, Cakmak HA, Pusuroglu H, Somuncu U, et al. (2016) .The prognostic value of admission mean platelet volume to platelet count ratio in patients with ST-segment elevation myocardial infarction undergoing primary percutaneous coronary intervention. Kardiol Pol; 74: 346-355.
19-Guenancia C, Hachet O, Stamboul K, Béjot Y, Leclercq T et al. (2017) Incremental predictive value of mean platelet volume/platelet count ratio in in-hospital stroke after acute myocardial infarction. Platelets; 28: 54-59.
20-Wang RT, Li Y, Zhu XY, Zhang Y (2011). Increased mean platelet volume is associated with arterial stiffness. Platelets; 22: 447-451
20- Tzur I,a Barchel D,a Izhakian S,a Swarka M,a Jehoshua O G,b Krutkina E, b Plotnikov G,a and GorelikJ O. 92019). Platelet distribution width: a novel prognostic marker in an internal medicine ward. Community Hosp Intern Med Perspect; 9(6): 464–470.