RESEARCH ARTICLE

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The Effect of Periodic Examination Time Interval and Frequency After “Percutaneous Coronary Intervention” on Experiencing Second "Acute Coronary Syndrome"

ABSTRACT

Objective: The aim of this study was to evaluate the effect of follow-ups of patients who underwent percutaneous coronary intervention (PCI) at short (<6 months) and long-term intervals and media on their experiencing attacks of acute coronary syndrome (ACS).

Methods: The data of 281 patients who underwent twice PCI in our clinic were retrospectively analyzed. The patients were divided into two groups as those who came to the controls regularly at intervals of ≤ 6 months (Group 1, n: 157) and those who came irregularly or at intervals of more than 6 months (Group 2, n: 124). We investigated whether regular periodic controls have any positive effect on adequate statin use, experiencing acute coronary syndrome episodes and cardiac mortality.

Results: In Group 2; frequency of ACS [87.8% versus 20.6%, p<0.001], insufficient use of statins [86.4% versus 16.7% p <0.001], and withdrawal of statins by media influence [64.0% versus 5.1% p <0.001] was higher than Group 1.

Conclusions: Looking at the results of the study; it can be said that regular follow-up of patients with a cardiac event at 6-month intervals reduces the rate of acute coronary syndrome experience and treatment compliance is better in these people.

Keywords: Acute Coronary Syndrome, Angioplasty, Follow-Up Studies, Therapeutics Compliance.

“Perkütan Koroner Girişim” Sonrası Periyodik Muayene Zaman Aralığı ve Sıklığının İkinci "Akut Koroner Sendrom" Yaşanmasına Etkisi

ÖZET

Amaç: Bu çalışmayla perkütan koroner(PKG) girişim geçiren hastaların 6 aydan kısa ve uzun sürelerle kontrol edilmelerinin ve medyanın akut koroner sendrom(AKS) yaşamalarına etkisi araştırılmıştır.

Gereç ve Yöntem: Kliniğimizde iki kez PKG geçirmiş 281 hastanın bilgileri retrospektif olarak incelenmiştir. Bu hastalar 6 ay ve daha kısa süreli düzenli takibe gelenler (Grup 1, n: 157) ve 6 aydan uzun sürelerle veya düzensiz takibe gelenler (Grup2, n: 124) ve olarak iki gruba ayrılmışlardır. Düzenli takiplerin yeterli statin kullanımında, akut koroner sendrom geçirmede ve kardiyak sebeple ölüm üzerinde etkili olup olmadığı araştırılmıştır.

Bulgular: AKS sıklığı (87.8 e karşı 20.6% <0.001), yetersiz statin kullanım oranı[86.4 e karşı 16.7%, p<0.001], medyanın etkisiyle (%64.0 e karşı %5.1, p<0.001) statin kullanımını bırakanların oranı, Grup 2 de, Grup 1 den yüksek bulunmuştur.

Sonuç: Çalışmanın sonuçlarına bakılınca; kardiyak olay yaşayan hastaların 6 ay aralarla düzenli takibe gelmelerinin, akut koroner sendrom yaşama oranlarını azalttığı ve tedavi uyumunun bu kişilerde daha iyi olduğu söylenebilir.

Anahtar Kelimeler: Primer Perkütan Girişim, Akut Koroner Sendrom, Düzenli Klinik Takip, Tedavi Uyumu.

INTRODUCTION

Acute coronary syndrome is an important cause of morbidity and mortality in the community. Patients who undergo primary PCI are more likely to have a new ACS compared to other members of the population (1, 2). Despite a successful intervention, patients outcomes may not be good enough unless regular follow-up and treatment is provided. The first month after discharge is the period when the morbidity and mortality rates are the highest. Therefore, it is very important for the patients to get in close contact with their physicians in the first month, and to be followed closely by their physicians in the following months. Even in patients who have not undergone percutaneous intervention, strict medical treatment and aggressive LDL-lowering therapy reduce the patient's chance of experiencing acute coronary syndrome and improve quality of life (3-8). Adequate medication reduces the likelihood of patients experiencing a second event. Regular check-ups are of great importance to ensure this. In studies investigating the efficacy of the treatment, optimum results can be obtained since patients are followed regularly. In reality, regular follow-ups are often not provided. It is very important to inform patients who are followed up irregularly, do not want to use medication, or receive insufficient statin therapy. Regular follow-up of patients can help detect new events early and thus increase the survival rates of patients (9-13). Moreover, lowering LDL below 55 mg / dl decreases the possibility of ACS in patients with coronary artery disease (14).

In the current study, we aimed to investigate how regular follow-ups at 6-month intervals affect drug use, the possibility of experiencing a second ACS attack, and whether it has any effect on cardiac mortality.

MATERIAL AND METHODS

Patient Selection and Study Design: A total of 3285 patients who underwent PCI between 2011 and 2017 were scanned to determine the frequency of periodic examinations of patients who underwent two or more PCIs. A total of 345 patients who underwent PCI for the second time were identified. The data of patients who underwent second PCI were obtained by medical hospital computer systems. In consultation with the patients and their relatives, it was determined which factors affected the patient's compliance with treatment, whether they were treated in another institution or whether they participated in regular follow-ups in another institution. Two hundred and eighty one patients who remained after the exclusion criteria were applied were included in the study. Patients eligible for the study were divided into two groups as Group 1 (n: 157) who participated in control visits regular or less than 6 months and Group 2 (n: 124) who participated in control visits irregular or later than 6 months (Figure 1). Age, gender, mean follow-up period, diabetes, hypertension, hyperlipidemia, history of CABG, presence of peripheral arterial disease, blood creatine levels, body mass index (BMI), presence of prevalent coronary artery disease in the family, smoking status of the patient, use of beta-blockers, antiplatelet medicines, ACE inhibitors, ARB and vasodilator medicine were recorded.

Exclusion Criteria of the Study: Patients who were followed for less than a year were excluded from the study, as shorter follow-up time may impair statistical significance in comparisons. Furthermore, the disabled or too old patients, patients whose attendance to control visits was hardly possible, and those who would not be able to come for control visits for various reasons were excluded from the study. Patients who were not residing in city of the study and who could not attend the control visits were not included in the study. Moreover, patients with end-stage chronic diseases and cancer with short life expectancy were also excluded from the study. This study complied with the Declaration of Helsinki, and it was approved by the independent medical ethics committee of Sakarya University Education and Research Hospital.

Study Endpoints: The primary end-point of the study was the presence of acute coronary syndrome in the second procedure. Cases with acute myocardial infarction with or without ST elevation were recorded. The median follow-up period of the patients included in the study was 5 years. For this reason, 5-year cardiac mortality rates were recorded based on the median follow-up period and determined as the primary endpoint in the comparison. Inability to reduce LDL levels down to 70 mg/dL and / or use of $\leq$ 10 mg rosuvastatin, $\leq$ 20 mg atorvastatin, $\leq$ 40 mg simvastatin and pravastatin were defined as low dose or less effective statin therapy (15).

In clinical follow-ups, patients were asked whether they discontinued the medication, and why, how they were affected by the media, whether the medicine had side effects, or the medicine was discontinued or its dose was reduced due to prescription problems. Questions and answers were standardized and recorded for comparison.

The fact that medicines cannot be prescribed regularly is an important problem in our country. The patients are complaining that they cannot take their medications regularly because they are not prescribed regularly and physicians cannot prescribe medication due to certain stipulations imposed by SGK (Social Security System = the health insurance institution of Turkish government).

Statistical Method: Continuous variables were compared with “independent sample t test within 95% confidence interval. Mean values were

given together with ± standard deviations and intragroup percentages. Sig.2: P values were measured Levene's equality of variances test, t-test, and equality of means. The difference was considered significant if both p values were less than 0.05. Nominal data were analyzed by Pearson's chi square "and cross- table" test. P values less than 0.05 were considered significant.

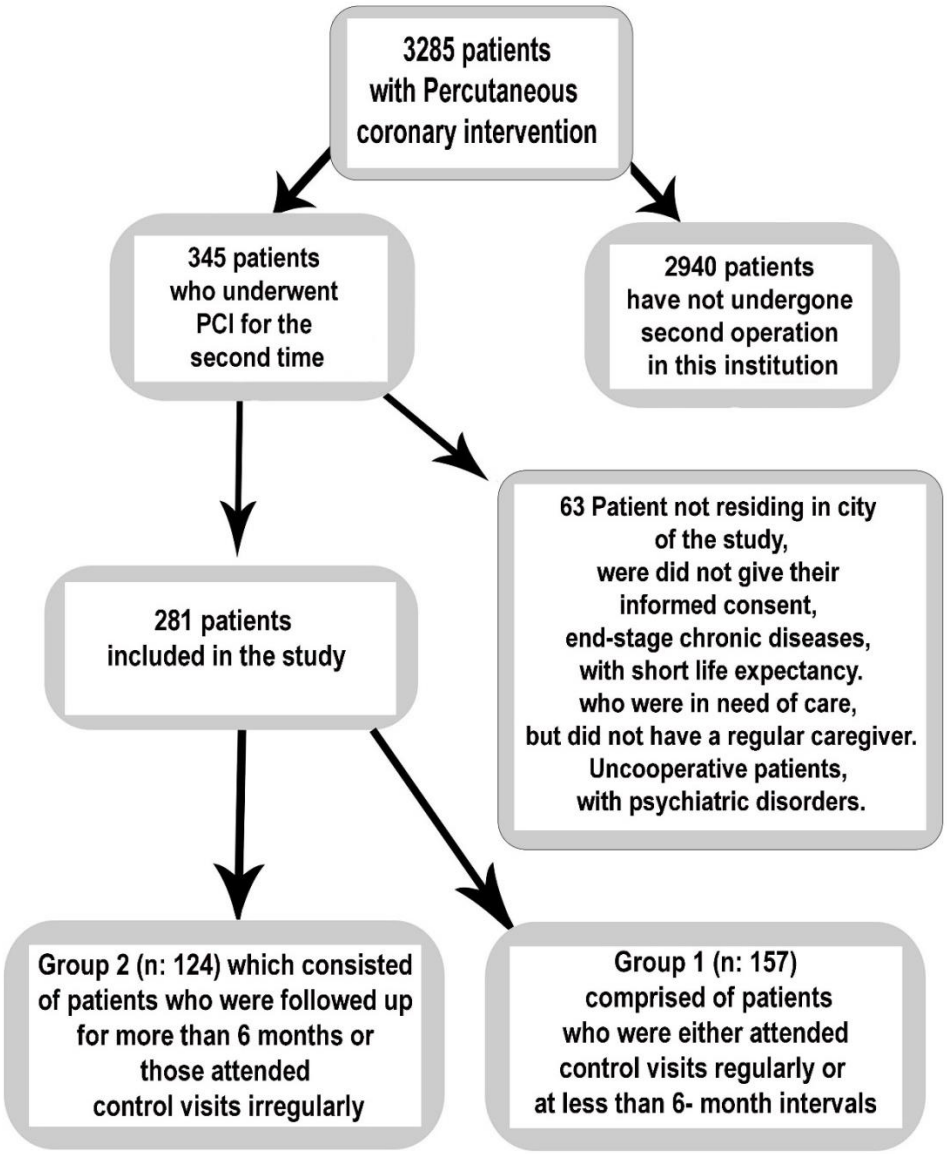

Figure 1. Algorithm of the study

RESULTS

Both groups were comparable in terms of age, female sex, education level, smoking status, diabetes, hypertension, and hyperlipidemia, history of CABG, body mass index (BMI), ejection fraction, peripheral vascular diseases, and blood creatine levels. In Group 1(n: 157), the mean follow-up period was shorter when compared with Group 2(n:124) (4.53 ± 1.24 vs 4.99 ± 1.08 / year p = 0.001).

Regarding the second procedure, both groups were comparable in proportion of patients in terms of Killip 3,4 class [12.3% (n: 7/57) vs 11.3% (n: 11/96) p = 0.861], in whom the same vessel was intervened in the second procedure [35.2% (n: 44/124) vs 31.2% (n: 49/157) p = 0.479], those discontinuing the statin treatment due to its side effects [1.6% (n: 2/124) vs 1.9% (n.3 / 157) P = 0.844], patients whose target lesion was in-stent restenosis in the second procedure, [2.2% (n: 4/124) vs 1.9% (n: 3/157) P = 0.483], ACE inhibitor or ARB users . [82.4% (103/124) vs 87.8% (n: 138/157) p = 0.193], betablocker users [55.2% (n: 69/124) vs 58.0% (n: 91/157) p = 0.642], nonusers of vasodilator medicines [72.0% (n: 90/124) vs 75.2% (n: 118/157) p = 0.549]. Regarding second procedures both groups were compared in terms of the presence of primary PCI [87.8% (n: 108/124), vs 20.6% (n: 32/155) p <0.001], cardiac mortality rate [9.6% (n: 12/124) vs 1.9% (n: 3/157) p = 0.004], ineffective statin

treatment [86.4% (n: 107/124) vs 16.3% (n: 20/157) p <0.001] , stopped using antiplatelet medicines [15.2% (n: 19/124), vs 1.9% (n: 3/157) p <0.001], those quitting statin treatment under the influence of adverse antimedicine propaganda in the media [%64.0 (n:80/124) vs. %5.1 (n:8/157) p<0.001] , due to prescription problems or usage of ineffective doses of statin ([20.0% (N: 25/124 vs. 5.7% (N: 9/157) p <0.001]). However patients with primary education only [64.8% (n: 81/124) vs. 51.0% (n: 80/157) p = 0.020] and/or higher LDL levels [122.53 ± 36.27 mg/dL vs. 74.62 ± 26.13 mg/dL p <0.001] were more frequently detected in Group 2 when compared with Group 1 (Table 1 -2).

Table 1. Baseline demographics and clinical presentations of groups.

	Patients with irregular follow-up (Group 2) N:124	**Patients with Regular follow-up (Group 1) N:157**	**P**
Age (years)	65.79±9.92	65.71±10.59	0,525
Female Gender	30.1% (n:37/124)	31.2 % (n:49/157)	0.839
Mean follow-up period (years)	4,53±1.24	4.99±1.08	**0.001**
Functional class (Killip 3-4)	12.3% (n:7/57)	11.3% (n:11/96)	0,861
High Education Level	35.2%(n:44/124)	49.0%(n:77/157)	**0.020**
Smoking Status	32.8% (n:40/122)	21.0%(33/157)	**0.029**
Diabetes Mellitus	61%(n:66/104)	49.5%(n:55/111)	0.072
Hypertension	84%(n:84/100)	86.6%(n:97/112)	0.592
Hyperlipidemia	86.6%(n:97/112)	84.8%(n:112/132)	0.696
Previous CABGa	15.3%(n:19/122)	16.6%(n:26/157)	0.779
Family history of CAD b	78.6%(n:92/117)	87.8(n:122/139)	**0.049**
BMI kg/m2	29.63±2.82	29.01±3.71	**0.045**
EF d(%)	46.56±8.92	50.74±8.55	**0.004**
Peripheric Vascular Disease	50.0%(n:62/124)	45.8%(n:84/155)	0.486
Ineffective Statin use	86.4%(n:107/124)	16.3%(n:20/157)	**<0.001**
LDL Level (mg/dl)	122.53±36.27	74.62±26.13	**<0.001**
Beta Blocker Use	55.2%(n:69/124)	58.0%(n:91/157)	0.642
Nonusers of antiplatelet medicines	15.2%(n:19/124)	1.9%(n:3/157)	**<0.001**
ACEf inhibitor or ARBg use	82.4%(103/124)	87.9%(n:138/157)	0.193
Nonusers of vasodilator medicines	72.0%(n:90/124)	75.2%(n:118/157)	0.549
Creatinine level (mg/dl)	0.98±0.24	1.11±0.57	**0.012**

a Coronary artery bypass graft, b Coronary artery disease, c Body mass index, d Ejection fraction, e Percutaneous coronary intervention, f Angiotensin converting enzyme, g Angiotensin receptor blockers.

Table 2. Clinical outcomes and procedural characteristics of groups

	Patients with irregular follow-up (Group 2) N:124	**Patients with regular follow-up (Group 1) N:157**	**P**
Second procedure PCI	84.6%(n:104/124)	20.6%(n:32/155)	**<0.001**
In-stent Restenosis	2.8%(n:8/124)	1.4%(n:4/157)	0.094
Second intervention to the same vessel	36.2%(n:45/124)	31.3%(n:49/157)	0.376
Annual (%)cardiac mortality rate	9.6%(n:12/124)	4.5%(n:7/157)	**0.106**
Target vessel in the second procedure			
LAD or related graft	26.6%(n:33/124)	34.4%(n:54/157)	0.194
Cx or related graft	39.5%(n:49/124)	33.8%(n:53/157)	0.321
RCA or related graft	33.9%(n:42/124)	31.8%(n:50/157)	0.408

PCI, Percutaneous coronary intervention.

DISCUSSION

PCI patients who do not come to the follow-up visits periodically and at frequent intervals may be affected adversely by some publications in the media, and some negative situations in their social environment consequently they forget important information about their illnesses and medications over time, eventually they stop their medicine treatment, or reduce their medicine doses. In regular follow-ups, patient information and patient education can be said to have a positive effect on patients' clinical processes and health status. How important is the follow-up period on patients? How

often should follow-ups in the outpatient clinics be performed? Clinical experience suggests that patients who are followed up at intervals of more than 6 months forgot what they have learnt about their treatment (2, 10,16).

Patients who attended follow- up visits at long intervals forget important information. Besides, they are under the influence of anti-medicine publications in the media. Unfortunately, the negative impact of the media in our country causes patients to have a negative opinion, especially about statin use. Patients affected by the media think that statin is harmful and should not be used. So they stop using their medications. This neglect causes further progression of the disease in the coronary arteries, which are already atherosclerotic, and increases the rate of patients having heart attacks (5,6,16).

In a study investigating the effect of media on statin use in the UK in 2016, it was found that - as in our country- statin users, though not statistically significant number of patients, quitted statin use under the negative influence of media (17). In a very valuable study that investigated the effect of media on statin use in our country. It was found that at least 50% of patients who had to use statins had stopped using them within 5 years, and at least 60% of those who had not stopped using them were receiving insufficient doses of the medicine (17).

When we analyzed the results of the studies and our study, it is understood that 50% of the patients in the risk group either stopped statin treatment or reduced the dose of the medicine to an ineffective level due to anti-medicine propaganda in the media. In addition, 93% of the patients who refused to use statins despite contrary recommendations they cite anti-statin news in the media as the reason for their refusal (17,18).

Most of the patients who are against the use of medication, think that they protect themselves against risks by natural therapy. Unfortunately, the level of education does not have a positive effect on this issue. For example, when we investigated whether the level of education obviates negative media impact urging patients to quit their medications among all participants, the rate of cessation of therapy was not different between participants with higher and lower education levels. Fortunately, this withdrawal rate was not statistically significant lower at higher education level when compared with those with lower education level. This is a bit pleasing.

The proportion of highly educated persons in the regular follow-up group is significantly higher than that in the irregular follow-up group. [49.0% (n: 77/157) vs 35.2% (n: 44/124) p = 0.020]. In other words, people with a higher education level paid more attention to their health and attend follow-up visits more regularly (Table 3).

Table 3. The association between statin use, education level, regular follow-up

	Subgroup of <6-month /Irregular Follow-ups		
	Poorly educated	**Well Educated**	**P**
Quitters of medicine therapy	6.2%(n:5/80)	3.9%(n:3/77)	0.303
	Subgroup of > 6- month /Irregular Follow-up		
	Poorly educated	**Well Educated**	**P**
Quitters of medicine therapy	58.5%(n:48/82)	68.2%(30/44)	0.288
	All participants		
	Poorly educated	**Well Educated**	**P**
Quitters of medicine therapy	32.9%(n:53/160)	27.3%(n:33/120)	0.308
	Subgroup of well educated		**P**
Quitters of medicine therapy	< 6-month follow-up	> 6- month follow-up	
Quitters of medicine therapy	68.2%(n:30/44)	3.9%(n:3/77)	<0.001
	Subgroup of poorly educated		
Quitters of medicine therapy	< 6-month follow-up	> 6- month follow-up	P
Quitters of medicine therapy	59.3% (n:48/81)	6.2%(n:5/80)	<0.001

In addition, it was seen that the level of education is in line with short follow-up intervals and more regular follow-up visits. However, being educated cannot protect the person from the negative effects of the environment unless he / she attends regular follow-up visits (17).

This study may be expected to make a complementary contribution to the studies relating to media impact on medicine use and primary and secondary prevention studies. Majority (86.4%) of the patients in the risk group who had undergone percutaneous intervention did not use statin at the dose they should use and therefore they experienced episodes of acute coronary syndrome at significantly higher rates [87.8% (n: 108/124) vs 20.6% (n: 32/155) p <0.001]. They were also appear to be at a greater risk of cardiac mortality when compared with those regularly using adequate doses of statins. [9.6% (n: 12/124) vs. 1.9% (n: 3/157) p = 0.004].

Although the effectiveness of dual antiplatelet therapy and statin therapy in primary and secondary prevention of coronary artery diseases is clearly evident, especially in the media and on the Internet, publications are based on personal observations and preferences, which adversely affect the mass of patients. There is a bias against statin and antiplatelet therapy in patients who follow these publications, unfortunately, patients with this bias are disrupting their treatment (17, 18, 19, 20).

The results of this study also demonstrate the importance of calling the patients at short intervals for regular follow-ups, communicating with the patient and their relatives by face-to-face interviews during patient visits and telling the importance of using the medicine over and over again.

In addition, in clinical follow-ups, it is important to explain the mechanism of acute coronary syndrome onsets and in which situations patients should go to the emergency department or cardiologist. Also the benefits of medicines, especially the purpose of statin therapy should be expounded.

Based on the results of the research; mutual rapport between the doctor and the patient increases both the rate of early recognition of the disease and also the rate of maintenance statin therapy at an effective dose. For example; statin dose was not reduced in patients who had been followed up regularly for less than 6 months. However, it was found that patients who were followed up irregularly and at long intervals stopped taking regular and adequate doses of statin.

CONCLUSION

Anti-medicine, particularly anti-statin propaganda, through visual and written media prevails in our country. This propaganda adversely affects medicine use and increases the rate of experiencing acute coronary syndrome by the patients. From this point of view, the importance of regular follow-up and shorter intervals of less than 6 months is evident in order to neutralize the negative information and negative effects imposed on the patients. It is very important to inform the patient and their relatives about the signs, symptoms, and medications to be used at each visit, as if they are presenting to the clinic for the first time.

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