Kishida and Saito investigated in 109 patients with MI. During the mean follow-up period of 41.2 months, the cumulative cardiac event rate (nonfatal acute myocardial infarction and cardiac death) was significantly higher in patients with only asymptomatic episodes (SMI group) as well as in those with symptomatic episodes (chest pain group) than in patients without any ischemic episodes (control group). There was no statistically significant difference in the prognosis between the SMI and chest pain group.

3) Effective treatment: The efficacy of three standard antianginal drugs on silent myocardial ischemia was studied in 43 patients with EA using Holter monitoring. Antianginal drugs used were long-acting isosorbide dinitrate 40–80 mg/day for nitrates (17 patients), diltiazem 90–180 mg/day for calcium antagonists (13 patients), propranolol 30–60 mg/day or metoprolol 60–120 mg/day for \( \beta \)-blocker (13 patients). The severity of ischemia (total magnitude and duration of ST deviation) was improved with all three drugs. However, with respect to the frequency of ischemic episodes, nitrates and calcium antagonists did not reduce asymptomatic episodes in the daytime, while \( \beta \)-blockers significantly reduced both symptomatic and asymptomatic episodes throughout the day.

These results lead us to conclude that: 1) Silent myocardial ischemia is observed frequently in patients with ischemic heart disease during daily activities. 2) The presence of silent myocardial ischemia, as well as angina pectoris, may identify a high-risk group for the development of subsequent unfavorable outcome in patients with previous MI while on standard medical therapy. 3) \( \beta \)-blockers were a more effective means of reducing total ischemic burden, including silent ischemia, than nitrates or calcium antagonists in patients with EA.

Therefore, it should be recognized in the diagnosis and treatment of IHD, that anginal pain is only the tip of the iceberg; only a part of all ischemic burden. It seems critical for improvement of the determination of the prognosis of IHD to clarify the severity, duration and diurnal distribution of the total ischemic burden including silent ischemia and to treat the ischemia itself.

4. Supplementary

b. Prognosis of Silent Myocardial Ischemia and Its Strategy for Treatment

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The purpose of the present study was to clarify the prognosis of coronary artery disease patients with silent myocardial ischemia (SMI) and to determine therapeutic strategy for SMI. For this purpose, the cardiac event (i.e., acute myocardial infarction, cardiac death, PTCA/CABG, unstable angina) and its prognostic predictors were investigated in patients in whom Holter ECG monitoring, treadmill exercise testing and coronary angiography were performed. In addition, the clinical usefulness of personal and psychological tests was examined in patients with SMI.

Subjects and methods

To examine the prognosis of SMI, the 253 patients were classified into two groups: 93 patients with exertional angina (AP) without previous myocardial infarction (MI) and 160 patients with old MI. The presence of SMI was diagnosed by Holter ECG and followed for more than 6 months. The variables were analyzed using Cox regression technique (16 variables in AP and 19 in old MI). Survival curves were analyzed using the Kaplan-Meier method. AP patients were classified into two groups by the presence or the absence of SMI showing ST-segment depression on two 24-h Holter re-
cordings in spite of adequate medical treatment during the clinical course: 50 patients with SMI and 43 patients without SMI. In MI, there were 60 patients with SMI and 100 patients without SMI.

In order to determine the clinical usefulness of a personal psychological test as a means to develop therapeutic strategy for SMI, Maudsley Personality Inventory was performed to check patients for both neuroticism and extraversion or introversion in 44 patients with stable AP and in 46 patients with old MI. This test is performed using two scales, N (neuroticism) and E (extraversion). In cases where high scores are obtained, the N scale is referred to for neuroticism and the E scale for extraversion. In AP, 13 patients had asymptomatic Holter ischemia and 31 patients had symptomatic ischemia while in MI, there were 20 and 26 patients, respectively.

Results

The incidence of cardiac event in both AP and MI patients with SMI were significantly higher than in those without SMI (28% vs 9%, 32% vs 9%, respectively). The cardiac event rates in AP were 19% at 1 year, 25% at 3 years and 29% at 5 years in patients with SMI and 5%, 8% and 8% in patients without SMI, respectively (p < 0.01). The significant predictors of cardiac events in patients with SMI were severe coronary lesions, short exercise time and lowering of asynergy score in AP, and lowering of ejection fraction and maximum ST-segment depression on Holter monitoring in MI. In AP, the mean E scores were 35 ± 7 in asymptomatic group, 23 ± 13 in symptomatic group and 29 ± 9 in normal control (asymptomatic and normal vs symptomatic groups, p < 0.01, p < 0.05, respectively). In MI, the mean E scores were 28 ± 12, 23 ± 8 and 29 ± 9, respectively (symptomatic vs control groups, p < 0.05). The mean N scores were 7 ± 6, 17 ± 9 and 9 ± 6 in AP (asymptomatic and control vs symptomatic groups, p < 0.05, each) and 7 ± 7, 15 ± 10 and 9 ± 6 in MI (asymptomatic and control vs symptomatic groups, p < 0.001, p < 0.05, respectively). Asymptomatic group had extraversion and symptomatic group, introversion and neuroticism in spite of the lack of difference in the severity of coronary lesions.

Conclusion

It is suggested that AP and MI patients with SMI carry a poorer prognosis than those without SMI and the powerful predictors of prognosis were different between AP and MI in patients with SMI. In addition, SMI patients had extraversion. Thus, it is concluded that in addition to treatment for coronary artery disease, SMI patients also should receive behavioral counseling.