

Holter ECG Findings in Patients with Medial Arterial Calcinosi

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Abstract. *Introduction: Medial arterial calcinosis is an independent risk factor for cardiovascular and all-cause mortality. Aim of the study: To determine the incidence of cardiac arrhythmia and ischemia with the use of Holter ECG monitoring in a group of patients with medial calcinosis. Patients and Methods: 22 individuals (10 men and 12 women) with the mean age of 59 years were examined. Holter ECG monitoring with an average duration of 22.16 hours was carried out using Marquette-Hellige General Electric (USA) devices. Medial calcinosis was defined as ankle-brachial pressure index (ABI) with a value of 1.3 and more. Results: Only 2 patients (9 %) from our group had normal Holter ECG records, without arrhythmia or ischemia. Complex form of arrhythmia (Myerburg 4B or 4C) was in 11 patients (50 %), atrial fibrillation in 6 (27 %), 2nd degree A-V block Mobitz type I in 1 patient (4.5 %) and myocardial ischemia in 6 persons (27 %). Conclusions: In our study we found significant cardiac arrhythmia and/or ischemia in 91 % of investigated patients with medial arterial calcinosis. Our results confirm the importance of Holter ECG monitoring in this patients, because of increased cardiovascular risk, including sudden cardiac death.*

Keywords: medial calcinosis; Holter ECG; cardiac arrhythmia; ischemia

1. Introduction

The ankle-brachial pressure index (ABI) is a reliable warning sign of increased cardiovascular risk (1). In addition to peripheral artery disease, the ABI is an indicator of generalized atherosclerosis. According to recent studies low ABI levels are associated with higher incidence of coronary artery diseases as well as stroke.

Medial calcinosis (Mönckeberg's sclerosis) is a degenerative and apparently non-inflammatory disease in which the media of small and medium-sized muscular arteries becomes calcified independently of atherosclerosis. The disease is frequently related to diabetes mellitus, aging, male gender, autonomic neuropathy, osteoporosis, chronic kidney disease, hyperparathyroidism, smoking and hyperuricaemia.

Decreased ankle-brachial pressure index (ABI) is a well-known cardiovascular risk marker. ABI >1.3 in the presence of medial calcinosis is associated with increased cardiovascular morbidity and mortality.

2. Subject and Methods

We examined 22 individuals (10 men and 12 women) with the mean age of 59 year. The age range was 50-85 years. Diabetes mellitus was defined as current use of dietary interventions (2 patients), use of diabetes medications – oral hypoglycemic agents (6 patients) and insulin (8 patients). 9 patients had signs of chronic renal disease of which five were in the 4th stage according to K/DOQI classification. The median BMI (body mass index) was 32; the waist circumference median was 104 cm in men and 95 cm in women. 7 members of the group had

a history of previous myocardial infarction and 4 members had an ischemic stroke. During 1 year follow-up 3 patients died at home. An autopsy was not performed.

Holter ECG monitoring with an average duration of 22.16 hours was carried out using Marquette-Hellige General Electric (USA) devices with three channel electrodes system and MARS analyzing software. Artifacts were eliminated by visual inspection of each record.

Medial calcinosis was defined using the handheld Doppler probe as ankle-brachial index with a value of 1.3 and more. ABI measurement is noninvasive, simple and reproducible examination method, in which the Doppler probe measures the value of blood pressure in the arm and ankle.

3. Results

ABI values in the group of our patients ranged from 1.3 to 1.7 (median 1.5). Only 2 patients (9%) from group had no signs of arrhythmia and ischemia during ECG monitoring. All other members of the group (91%) had cardiac dysrhythmia and/or ischemia. Complex form of cardiac dysrhythmia – Myerburg 4B and 4C was found in 11 records. Results of all Holter ECG examinations are summarized in Table 1.

Table 1. Results of the Holter ECG monitoring (n=22).

Findings	Occurrence
Normal record – without ischemia or dysrhythmia	n = 2 (9%)
Atrial fibrillation	n = 6 (27%)
Complex form of dysrhythmia - Myerburg 4B or 4C	n = 11 (50%)
2 nd degree A-V block Mobitz type I	n = 1 (4.5%)
Myocardial ischemia	n = 6 (27%)

4. Discussion

Mönckeberg's sclerosis (MS) is a degenerative and apparently non-inflammatory disease in which the media of small and medium-sized muscular arteries becomes calcified independently of atherosclerosis. The exact pathogenesis of this process is far from being understood, but it is frequently related to diabetes mellitus, aging, male gender, autonomic neuropathy, osteoporosis, chronic renal failure, hyperparathyroidism, smoking and hyperuricaemia (2). In medial calcinosis calcium salts are depositing in the media of arteries thus reducing their elasticity. Native X-ray of the affected limb arteries shows continuous tubular shadows of the media ("rail tracking") in contrast to the complicated calcified atherosclerotic plaques, in which native X-ray shows spotted intermittent drawings of the plaques in the intima. Medial calcinosis is also more frequently observed in patients with autonomic neuropathy. Similar calcifications, which develop in diabetics with autonomic neuropathy, are also found in non-diabetic patients after lumbar sympathectomy.

Morphological findings in medial calcinosis differ also from calcifications of the lamina elastica interna in Giant-cell arteritis. Typical histopathological finding in Giant-cell arteritis is a granuloma, focal inflammation in the media (3). Affected are all layers of the vessel wall but dominantly media. It leads to fissures and fragmentation of internal elastic membrane

with the findings of calcification, which is one of the typical features of Giant-cell arteritis (4).

Reduced ABI is a reliable warning sign of increased cardiovascular risk, with ABI values below 0.7 indicating a significantly worse prognosis from the aspect of survival compared to subjects with normal ABI values (range from 0.9 to 1.1) (5). Criqui et al. have pointed out that cardiovascular mortality during a 3-year follow-up was directly related to ABI values: in severe ischemia ABI below 0.7 and medial calcinosis ABI 1.3 and more. Similar results were also found in a 6-year mortality follow-up (6).

Coronary artery atherosclerosis in diabetic patients occurs much earlier than in non-diabetic patients and reaches a greater extent (7). 16 members of our group had diabetes mellitus. 50% of group members already had myocardial infarction or ischemic stroke. These findings are consistent with the occurrence of metabolic syndrome (MS) in our group. It is widely known that people with MS have a higher morbidity and mortality compared to people without MS (8).

There are also other factors that participate in the development of MS and its complications including proatherogenic dyslipoproteinemia and proinflammatory state. We cannot omit the factor of age that affects all levels of pathogenesis, explaining the increasing prevalence of MS with the age (9, 10). These factors could contribute to the occurrence of cardiac dysrhythmia and ischemia in our group of patients.

5. Conclusions

During Holter ECG monitoring in patients with medial arterial calcinosis we found high incidence of cardiac dysrhythmia and/or myocardial ischemia (together 91%). Patients with medial calcinosis are in risk of serious cardiac complications including sudden cardiac death. Therefore interdisciplinary approach to patients is crucial. ABI examination can reveal persons with increased cardiovascular risk. It is a simple, non-invasive and reproducible method which should be done routinely during overall cardiovascular risk estimation.

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