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Atrial fibrillation (AF) and co-morbidity in elderly. A population based survey of 85 years old subjects

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ABSTRACT

The occurrence of AF increases sharply with age. The aim of this study was to explore and compare prevalent co-morbidity and self-estimated health-related quality of life (HRQoL) in subjects with AF versus subjects with sinus rhythm or pacemaker in 85 years old subjects. We analyzed data from a population of 336 eighty-five years old subjects participating in the Elderly in Linköping Screening Assessment (ELSA-85) study. Medical history was obtained from postal questionnaire, medical records and during medical examination that included a physical examination, cognitive tests, non-fasting venous blood samples and electrocardiographic (ECG) examination. 19% had an ECG showing AF. There were very few significant differences regarding medical history, self-estimated quality of life (QoL), laboratory- and examination findings and use of public health care between the AF group and the non-AF group. The study showed that the population of 85 years old subjects with AF was surprisingly healthy in terms of prevalent co-existing medical conditions, healthcare contacts and overall HRQoL. We conclude that elderly patients with AF do not in general have increased co-morbidity than subjects without AF.

1. Introduction

The occurrence of AF increases with age and the prevalence has previously been shown to be between 9% and 18% in subjects over 80 years old compared to about 0.5% in the ages 50–59 years old (Kannel et al., 1998; Heeringa et al., 2006). A risk factor for developing AF is the presence of cardiovascular disease; high systolic blood pressure, prior myocardial infarction (MI), valvular heart disease and left atrial enlargement (Mozaffarian et al., 2008). Also hyperthyroidism, overweight, excessive use of alcohol, and male sex (Friberg et al., 2003; Mukamal et al., 2005; Heeringa et al., 2006, 2008) are predictors of AF. Prior studies have suggested that patients with AF have an impaired QoL depending on accurate rate and rhythm control (Thrall et al., 2006). Furthermore AF is also associated to diabetes (Ostgren et al., 2004; Du et al., 2009), decreased glomerular filtration rate (GFR) (Iguchi et al., 2008; Schmidt et al., 2010) and regular physical activity that has been shown to lower the risk of developing AF in older adults (Mozaffarian et al., 2008).

AF is associated with a five times greater risk of cardio embolic stroke (Lotze et al., 2010), which increases in old age (Wolf et al., 1991; Rojas et al., 2007). However prophylactic oral anticoagulation (OAC) treatment is not, by clinicians, always thought to be suitable in an older, frail patient with present and maybe dominating co-morbidities such as cognitive impairment or giddiness and high risk of falling, where the fear of potential risk of OAC with intracranial hemorrhage is believed to exceed the benefits, following the reduced risk of cardio-embolic stroke (Vasishta et al., 2001). Recently it has been shown that the benefits of OAC are of great importance especially for an older patient with AF who has a greater risk of cardio-embolic stroke than a middle aged patient with AF. Risk of major bleeding is hard to estimate but is often overestimated. Furthermore, OAC appears to be protective in terms of stroke, MI and death in patients with a high risk of falling and multiple stroke risk factors (Tulner et al., 2010).

Data on elderly patients with AF are limited in the vast majority of AF studies. The aim of this study was to explore and compare prevalent co-morbidity and self-estimated HRQoL in subjects with AF versus subjects with sinus rhythm or pacemaker in 85 years old

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subjects in community based living or nursing homes in the municipality of Linköping, Sweden.

2. Methods

The ELSA-85 study is a population-based survey where all residents born in 1922 ($n = 650$), living in the municipality of Linköping, Sweden, were identified through the local authorities register and invited by letter to join the study at age 85. Data collection was performed between March 2007 and March 2008. The baseline data included a postal questionnaire, house call from occupational therapist and visit to the geriatric clinic for cognitive testing, blood samples, ECG and physical examination. The postal questionnaire contained questions about social network; need of assistance; use of assistive technology; presence of insomnia; feelings of loneliness; presence of factors contributing to worries about the future, medical history and current use of prescribed drugs. It also included the EQ-5D (1990), a generic instrument that assesses HRQoL in terms of mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension has three levels of severity graded from one to three; no problems, moderate problems or severe problems. The EQ-5D also contains a visual analog scale (VAS) that records the individual's self-rated evaluation of health, ranging from 0, worst imaginable health status, to 100, best imaginable health status. The scores of the five EQ-5D dimensions (VAS excluded) were converted to a single summary index value generated by means of the time trade off method (TTO) (Dolan, 1997; Rabin and de Charro, 2001).

Medical history was obtained from postal questionnaire, medical records and during medical examination by use of a specified protocol. A physical examination was performed with measurements of blood pressure in lying position after 5 min rest, height, waist circumference (to the nearest cm) and weight (to the nearest 0.1 kg) with the subjects wearing light indoor clothing. Non-fasting venous blood samples were drawn for measurement of plasma-glucose, serum-creatinine, TSH, C-reactive protein (CRP) and NT-proBNP. NT-proBNP was analyzed using the Elecsys 2010, Roche's method until September 2007 (total imprecision CV at level 180; 6.2% and at level 1900; 4.8%), and after that with the Modular E, modified Roche's method (total imprecision CV at level 90; 4.6% and at level 800; 4.5%). Estimated glomerular filtration rate (eGFR) as a parameter of renal function was calculated from serum creatinine level, age and weight according to the Cockroft–Gault formula (Cockcroft and Gault, 1976). An eGFR $\geq$60 ml/min was classified as normal or mildly impaired renal function, <60 ml/min was classified as moderate renal impairment and <30 ml/min as severe renal impairment (Schmidt et al., 2010).

A standard 12 lead ECG was recorded at 50 mm/s and 10 mm/mV standardization using a MAC 38 PC and interpreted according to American Heart Association (AHA) guidelines (Mason et al., 2007; Surawicz et al., 2009) manually and unidentified, by one physician (K.R.). The review comprised rhythm and pace; sinus rhythm, pacemaker or AF/flutter, bradycardia (<50 beats/min), tachycardia (>100 beats/min), and presence of pathological Q-wave indicating past ischemic event. ECGs were also analyzed according to Cornell voltage-duration product; (RaVL + SV3) times duration of QRS complex, adjusted for female gender by adding 6 or 8 mm to the sum of (RaVL + SV3), with a partition value of 2440 mm $\times$ ms to recognize left ventricular hypertrophy (LVH) (Devereux et al., 2001; Pewsner et al., 2007), and complemented with Sokolw–Lyon voltage index (SV1 + RV5 or V6) with >35 mm as partition value (Sokolow and Lyon, 1949). Hypertension was defined as a systolic blood pressure >140 mm Hg or diastolic blood pressure >90 or ongoing antihypertensive medication in accordance with WHO guidelines (Whitworth, 2003). Body mass index (BMI) was calculated using the formula weight $\times$ height^{-2} and defined as underweight if; <18.5 kg/m^2, normal range; 18.5–24.9, overweight; 25.0–29.9 and obesity if $\geq$30.0, according to the criteria of WHO (1995).

Cardio-embolic stroke risk was estimated using CHADS2 score (congestive heart failure, hypertension, age > 75, diabetes, each 1 point. Prior stroke or transient ischemic attack (TIA), 2 points). CHADS2 score was calculated in the AF group and two or more points were considered as indication for OAC (Gage et al., 2001; Rietbrock et al., 2008). Data concerning diabetes, prior stroke or TIA were obtained from postal questionnaire, medical history provided by subjects during medical examination and in case of uncertainty by medical records. Fall risk was estimated with use of Downton fall risk index (DFRI) that consider earlier falls, medication, sensory loss, cognitive impairment and walking ability. Three or more points indicate high risk of falling (Downton, 1993). Cognitive impairment was evaluated with a mini-mental state examination (MMSE) where 26 points of 30 or less were considered as mild cognitive impairment and 20 points or less as moderate to severe cognitive impairment (Folstein et al., 2001).

2.1. Statistical analysis

Analysis of binary variables was carried out using Fisher's exact test. Continuous variables with normal distribution were analyzed with an unpaired Student's *t*-test. Variables with skewed distribution were compared using the Mann–Whitney *U*-test. Statistical significance was set at $p < 0.05$. The PASW 18 software (IBM SPSS Statistics, Chicago, IL, USA) was used for analysis of data.

2.2. Ethics

The study, which complied with the declaration of Helsinki, was approved by the Regional Ethical Review Board in Linköping, Sweden, 2006-12-12 (Clinical-Trials, gov. number 141-06).

3. Results

Ninety percent ($n = 586$) of the 650 subjects responded to the invitation to participate in the study. Written informed consent was obtained from 496 individuals (78% of those alive) who also answered the postal questionnaire. During the course of the data collection, there was a drop-out of 158 subjects of which 13 died leaving 338 individuals (52%). However, two individuals were excluded because of poor quality or absent ECG registration due to technical problems. Hence, 143 men and 193 women remained for further analysis.

Out of the 336 participants, 25 females and 28 males had an ECG showing AF which comprised 13% of the female study population and 20% of the male study population, respectively.

Data presented in Table 1 show that history of CHF was more common in the AF group compared to the non-AF group but there were no significant differences in medical history apart from that. The AF group consumed more antihypertensive pharmaceuticals than the non-AF group, but there was no difference concerning history of hypertension between the groups. The AF group was also treated with warfarin to a higher extent than the non-AF group, but inversely the non-AF group was prescribed aspirin more often than the AF group. There was only one subject in the AF group that was treated with a low molecular weight heparin (LMWH) compared to none in the non-AF group.

There were no differences between the AF- and non-AF group concerning prior MI identified as pathological q wave or history of previous MI, presence of LVH calculated from ECG, using both the Cornell duration product and Sokolw–Lyon index, history of diabetes, previous stroke or TIA. Adding 6 or 8 mm in the formula